



ROCKWELL INTERNATIONAL
NORTH AMERICAN SPACE OPERATIONS
ROCKY FLATS PLANT

Remedial Investigation Report For 903 Pad, Mound, and East Trenches Areas

Volume VI

U.S. DEPARTMENT OF ENERGY

***Rocky Flats Plant
Golden, Colorado***

31 December 1987

DRAFT

REVIEWED FOR CLASSIFICATION/UCNI

By F. J. Curran

Date 4-1-91

UNITED STATES DEPARTMENT OF ENERGY
ADMINISTRATION CONTRACT DE-AC04-76DPO3533

A-DU02-000

ADMIN RECORD

APPENDIX E
HYDROGEOLOGIC DATA

INDEX OF DATA

Boring No.: 1-71

Completed as well? Yes

Data in File

- ☐ Log of Borehole
- ☒ Well Construction Summaries
- ☐ Well Development Summaries
- ☐ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

WELL SUMMARY

J10K

903 PAD AREA

Well Name: W-1-71

Elev. of Ground: 5950.0

Elev. of Top of Casing: 5950.83

Coordinates: N35823.88 E23205.49

Date of Construction: 1971

Constructed By: _____

Available Information

Geologic Log: NO

Geophysical Log: NO

Construction Details: ✓ ?

Permeability Test: NO

Water Level Data: ✓

Water Quality Data: X

13.25' 16.10 3/22/55

Condition of Surface

Internal Casing

Material: STEEL

Internal Diameter: 6 1/8"

Outside Diameter: 6 7/8"

Total Depth: 30.05

Stick-Up: 0.85'

Condition: RUSTY w/ MAJOR LID & HOLE

Protective Casing

Material: NO

Internal Diameter: _____

Outside Diameter: _____

Total Depth: _____

Stick-Up: _____

Locked: NO

Condition: _____

Surface Seal: NO

12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
** Well Number: 0171			
08/25/86	13.04	5950.83	5937.79
08/27/86	13.35	5950.83	5937.48
12/01/87	15.13	5950.83	5935.70

INDEX OF DATA

Boring No.: 2-71

Completed as well? Yes

Data in File

 Log of Borehole
 X Well Construction Summaries
 Well Development Summaries
 Hydraulic Conductivity Test Data
 and Results
 Packer Test Data and Results
 X Water Level Data

WELL SUMMARY

J10K

903 PAD AREA

Well Name: W-2-71

Elev. of Ground: 5936.2 Elev. of Top of Casing: 5936.79

Coordinates: N 35528.12 E 22831.33

Date of Construction: _____ Constructed By: _____

Available Information

Geologic Log: NO Geophysical Log: YES

Construction Details: NO Permeability Test: NO

Water Level Data: ✓ Water Quality Data: ?
8.31 16:03 3/22/85

Condition of Surface

Internal Casing

Material: STEEL

Internal Diameter: 6'8"

Outside Diameter: 6'2"

Total Depth: 29.23'

Stick-Up: 0.59

Condition: RUSTY 7 HINGE LID 7 HASP

Protective Casing

Material: NO

Internal Diameter: _____

Outside Diameter: _____

Total Depth: _____

Stick-Up: _____

Locked: NO

Condition: _____

Surface Seal: NO

12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
** Well Number: 0271			
08/25/86	10.10	5936.79	5926.69
08/27/86	26.55	5936.79	5910.24
12/01/87	8.92	5936.79	5927.87

INDEX OF DATA

Boring No.: 1-74

Completed as well? Yes

Data in File

- ☐ Log of Borehole
- ☒ Well Construction Summaries
- ☐ Well Development Summaries
- ☒ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

WELL SUMMARY

J10K

MOUND AREA

Well Name: W-1-74

Elev. of Ground: 5968.0

Elev. of Top of Casing: _____

Coordinates: N 36643.8 E 23069.0

Date of Construction: _____

Constructed By: _____

Available Information

Geologic Log: YES (ATTACHED)

Geophysical Log: _____

Construction Details: NO

Permeability Test: YES

Water Level Data: ✓

Water Quality Data: _____

44.40' 14:32 3/21/85 14.44'

16:17 3/22/85

Condition of Surface

Internal Casing

Material: PVC

Internal Diameter: 6'

Outside Diameter: 6 1/4"

Total Depth: 24.96'

Stick-Up: 40.80'

Condition: GOOD, SLIGHTLY DIRTY HAS SLIP ON LID

Protective Casing

Material: STEEL

Internal Diameter: _____

Outside Diameter: 11 3/4"

Total Depth: _____

Stick-Up: 1.58'

Locked: NO, HINGED COVER ROCK ON TOP

Condition: GOOD, THIN GAUGE

Surface Seal: CIRCULAR CONCRETE PADS - GOOD

12/28/85

Length of inflow = $24.16 - 14.83 = 9.33'$ See Sketch

$\phi = 6''$

Using This -

too non-ideal for any type calc.

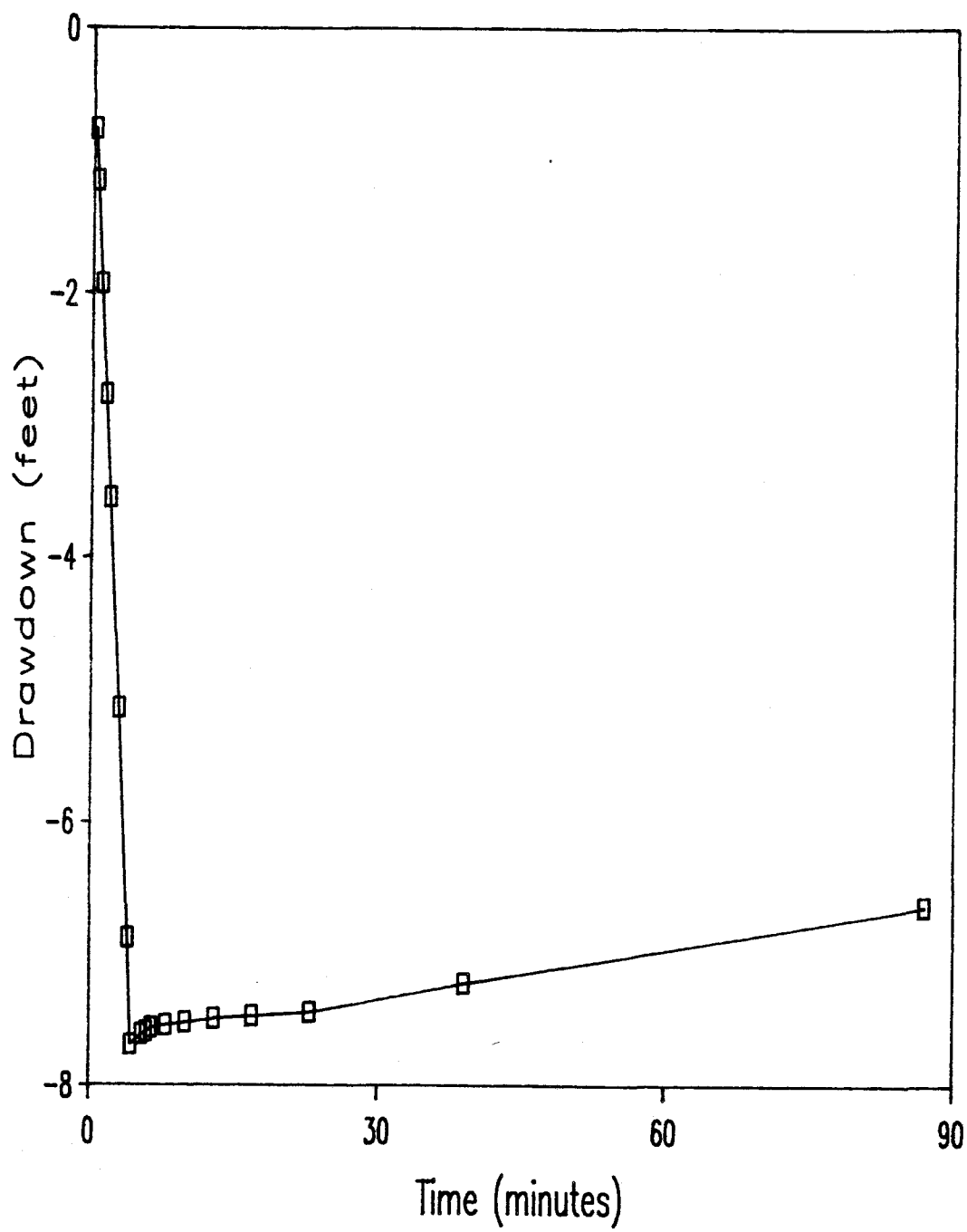
WELL 1-74

Time (minutes)
Drawdown (feet)

	0	OPump at 2.53 gpm
	.25	.76
	.5	1.15
	1	1.93
	1.5	2.77
	2	3.55
	3	5.14
	4	6.88
9.93	4.38	7.69
9.93×10^{-5}	5.5	7.61
8.64	6	7.59
8.60	6.5	7.56
5.82	8	7.54
4.25	10	7.52
3.27	13	7.49
2.96	17	7.47
	23	7.44
1.9	39	7.22
	87	6.64
1.95		
1.90		

$K_{avg} = 4.0 \times 10^{-5} \text{ cm/sec.}$

WELL 1-74



12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
** Well Number: 0174			
08/20/86	18.23	5968.00	5949.77
08/25/86	18.60	5968.00	5949.40
08/26/86	20.81	5968.00	5947.19
12/01/87	13.64	5968.00	5954.36

INDEX OF DATA

Boring No.: 3-74

Completed as well? Yes

Data in File

- ☐ Log of Borehole
- ☒ Well Construction Summaries
- ☐ Well Development Summaries
- ☐ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

WELL SUMMARY

J10K

EAST TRENCHES AREA

Well Name: W-3-74

Elev. of Ground: 5819.1

Elev. of Top of Casing: _____

Coordinates: N 39030.4 E 23930.4

Date of Construction: _____

Constructed By: _____

Available Information

Geologic Log: _____

Geophysical Log: _____

Construction Details: _____

Permeability Test: _____

Water Level Data: ✓

Water Quality Data: _____

23.62'

12:53 3/27/85

Condition of Surface

Internal Casing

Material: 6" SCH 40 PVC

Internal Diameter: 5 7/8"

Outside Diameter: 6 1/4"

Total Depth: 25.04'

Stick-Up: 1.06'

Condition: GOOD DIRTY

Protective Casing

Material: THIN GALVANIZED STEEL

Internal Diameter: 11 7/8"

Outside Diameter: 12"

Total Depth: 2.93'

Stick-Up: 1.86'

Locked: NO HINGED LID w/ HASP

Condition: GOOD DIRTY RUSTY

Surface Seal: 2' of CONCR. PAD CRACK ON

" N 5' S.W. SIDES

12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
** Well Number: 0374			
08/20/86	21.56	5820.16	5798.60
08/25/86	21.61	5820.16	5798.55
12/01/87	21.23	5820.16	5798.93

INDEX OF DATA

Boring No.: 7-74

Completed as well? Yes

Data in File

- ☐ Log of Borehole
- ☒ Well Construction Summaries
- ☐ Well Development Summaries
- ☐ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

WELL SUMMARY

J10K

EAST TRENCHES AREA

Well Name: W-7-74

Elev. of Ground: 5946.50 Elev. of Top of Casing: _____

Coordinates: N 36427 9 E 25071 9

Date of Construction: 1974 Constructed By: _____

Available Information

Geologic Log: _____ Geophysical Log: _____

Construction Details: _____ Permeability Test: _____

Water Level Data: ✓ Water Quality Data: _____

42.47' 13:17 3/27/85

Condition of Surface

Internal Casing

Material: 6" SCH 40 PVC w/ SLIP CAP

Internal Diameter: 5 7/8"

Outside Diameter: 6 1/4"

Total Depth: 50.15'

Stick-Up: 0.48'

Condition: GOOD DIRTY

Protective Casing

Material: THIN GALV STEEL

Internal Diameter: 11 3/4"

Outside Diameter: 12"

Total Depth: 2.79'

Stick-Up: 1.98'

Locked: NO HINGED LID w/ HASP

Condition: GOOD RUSTY, DIRTY

Surface Seal: 2" Ø CONCR PAD CRACK ON WEST SIDE

12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
--------------------------	------------------------------------	-------------------------------	-----------------------------------

** Well Number: 0774

08/20/86	40.23	5946.98	5906.75
08/22/86	40.15	5946.98	5906.83
12/01/87	40.17	5946.98	5906.81

INDEX OF DATA

Boring No.: 22-74

Completed as well? Yes

Data in File

 x Log of Borehole
 x Well Construction Summaries
 Well Development Summaries
 x Hydraulic Conductivity Test Data
and Results
 Packer Test Data and Results
 x Water Level Data

WELL SUMMARY

J10K

MOUND AREA

Well Name: W 22-74Elev. of Ground: 5956.8 Elev. of Top of Casing: _____Coordinates: N 36542.5 E 24002.4

Date of Construction: _____ Constructed By: _____

Available Information

CARRA. NEWTON

Geologic Log: NO Geophysical Log: YESConstruction Details: NO Permeability Test: YESWater Level Data: ✓ Water Quality Data: _____25.0' 13:35 3/27/85

Condition of Surface

Internal Casing

Material: 3" SCH 40 PVC NO CAPInternal Diameter: 3 1/8"Outside Diameter: 3 1/2"Total Depth: 41.05' ← PROB 199' BY CORROSION.Stick-Up: 0.69'Condition: GOOD

Protective Casing

Material: THICK GAUGE STEELInternal Diameter: 11 3/4"Outside Diameter: 12"Total Depth: 2.14'?Stick-Up: 1.86Locked: NO HINGED LID w/ MASPCondition: GOOD BUT RUSTY

SURFACE CASING

6" SCH 40 PVC

6 1/4" O.D.

5 1/8" I.D.

NO CAP

0.90 S.U.

Surface Seal: 2' Ø CONCR. PAD GOOD

Assume RF not suited & all flow from Anapacite.

PMD
12/33/35

SANDS ARE 120-170

$$L = 190 - 23 = 176'$$

TD Final unit

$$\phi = 3\frac{1}{3}'' = 3.13''$$

$$L_{sands} = (145 - 138.5) + (153 - 155.5) = 9'$$

$$K \approx 5.3 \times 10^{-3} \text{ cm/sec}$$

WELL 22-74

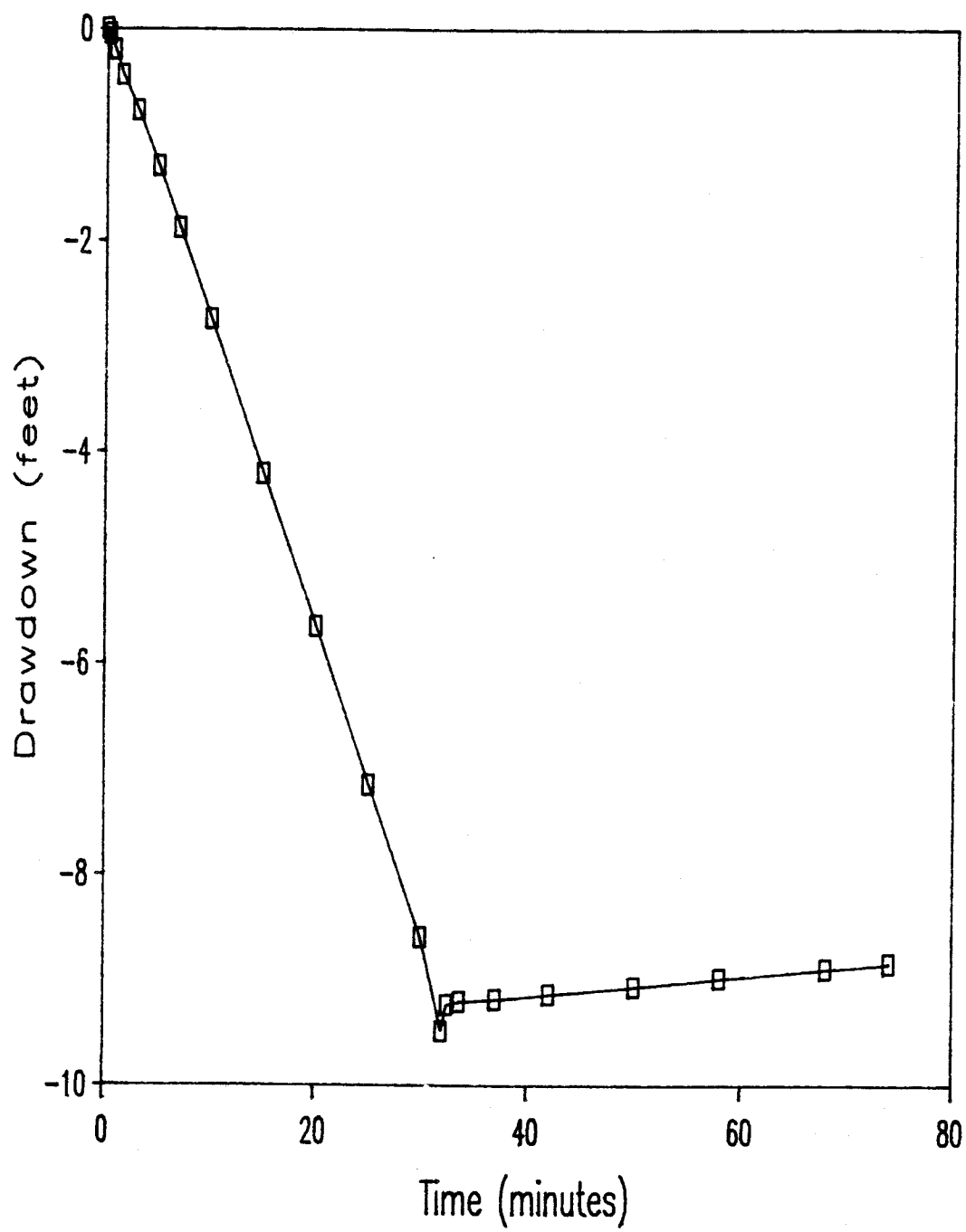
Time (minutes)
Drawdown (feet)

	0	OPump at 0.71 gpm
	.25	.049
	.75	.2
	1.5	.44
	3	.78
	5	1.3
	7	1.88
	10	2.74
	15	4.21
	20	5.65
	25	7.15
	30	8.59
	32	9.48
	32.5	9.23
	33.67	9.2
	37	9.18
	42	9.13
	50	9.06
	58	8.98
	68	8.89
	74	8.84
	1498	2.1

$K_{avg} = 2.7 \times 10^{-7} \text{ cm/sec.}$
for entire well.

Again, actual situation with 1.6m.

WELL 22-74



12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

Date
Measured

Depth to Water
from TOC

Elevation
TOC (ft)

Water Level
Elev. (ft)

** Well Number: 2274

12/01/87

22.50

5957.49

5934.99

INDEX OF DATA

Boring No.: 10-81

Completed as well? yes

Data in File

- ☐ Log of Borehole
- ☒ Well Construction Summaries
- ☐ Well Development Summaries
- ☒ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

WELL SUMMARY

J10K

Well Name: W-10-81 (7-82)
ON 11/10

Elev. of Ground: _____

Elev. of Top of Casing: _____

Coordinates: _____

Date of Construction: _____

Constructed By: _____

Available Information

Geologic Log: NO *PROBABLY ALL QRF*

Geophysical Log: NO

Construction Details: NO

Permeability Test: YES

Water Level Data: ✓

Water Quality Data: _____

18.68' @ 13.19 3/2/85

Condition of Surface

Internal Casing

Material: SCH. 40 PVC

Internal Diameter: 6"

Outside Diameter: 6 7/8"

Total Depth: 31.81'

Stick-Up: 2.11'

Condition: GOOD

Protective Casing

Material: _____

Internal Diameter: _____

Outside Diameter: _____

Total Depth: _____

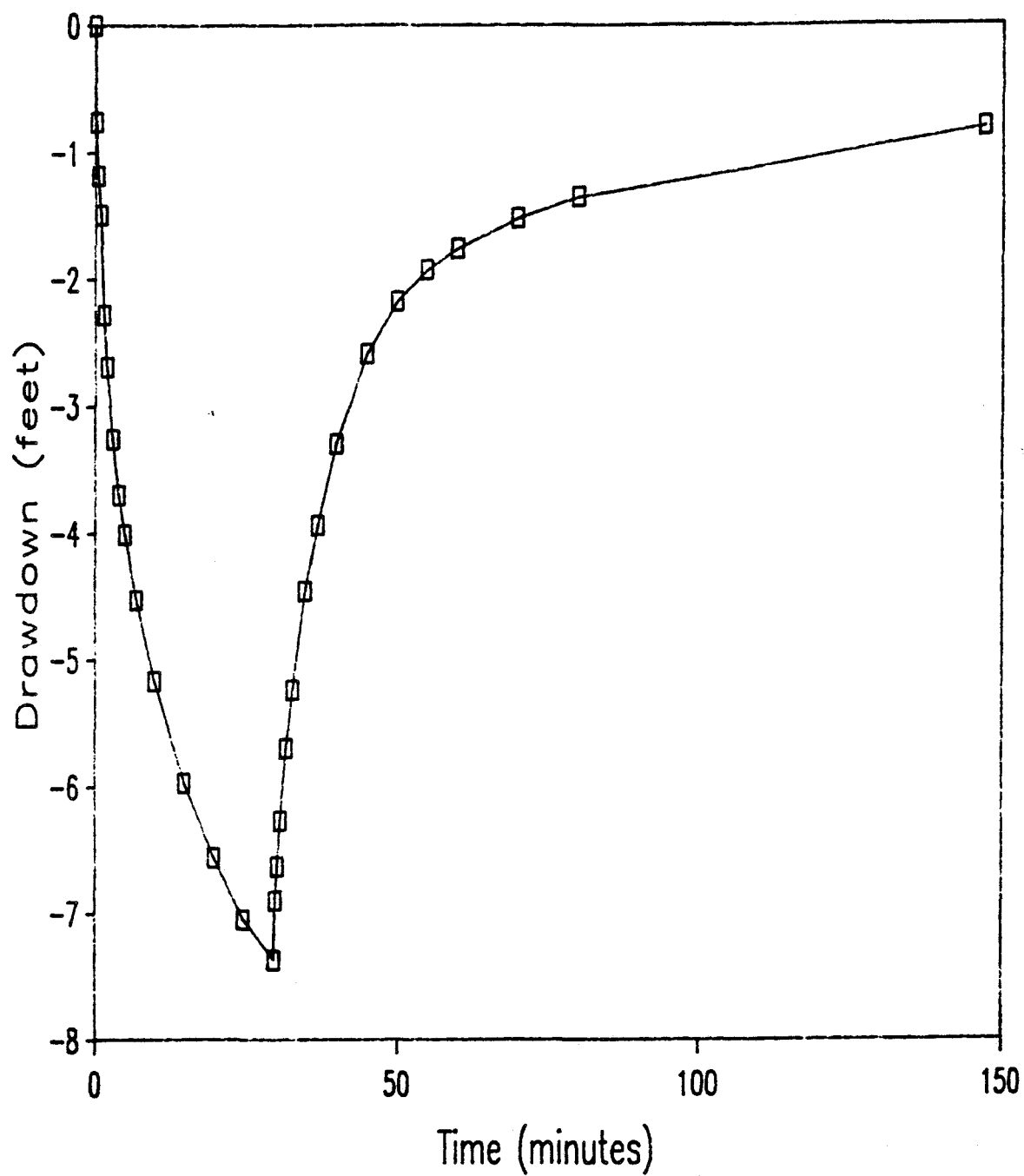
Stick-Up: _____

Locked: NO PVC SLIP ONE CAP

Condition: _____

Surface Seal: EARTH

WELL 10-81



TIME-DRAWDOWN DATA: WELL 10-81

TIME (min)	DRAWDOWN (feet)
0	.00
.25	.76
.5	1.18
1	1.49
1.5	2.28
2	2.69
3	3.26
4	3.70
5	4.01
7	4.53
10	5.17
15	5.97
20	6.56
25	7.05
30	7.37
30.25	6.90
30.5	6.63
31	6.27
32	5.70
33	5.24
35	4.46
37	3.94
40	3.30
45	2.59
50	2.18
55	1.93
60	1.76
70	1.52
80	1.35
147	.81

Pumping at 7.82 gpm

$$7.92 \frac{\text{gal}}{\text{min}} \times \frac{1.232 \frac{\text{ft}^3}{\text{gal}}}{18.6} = 1.056 \frac{\text{ft}^3}{\text{min}}$$

$$r = .25$$

Pumping ends

$$T = .1 \frac{\text{ft}^2}{\text{min}}$$

$$S = .1$$

WATER LEVEL DATA

WELL LOCATION _____

MEASURING POINT _____

ELEVATION: MEASURING POINT _____

GROUND LEVEL _____

[illegible]

LOCATION

PROJECT

EXPLANATION OF SYMBOLS AND TERMS
ON BORING LOGS

SAMPLE TYPE



Split Spoon



NC Core

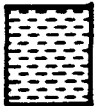


Continuous Drive



Bulk

GRAPHIC LOG



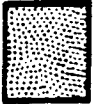
Clay or Shale



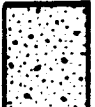
Clayey Sand or Sandy Clay



Gravel



Sand or Sandstone



Sand and Gravel



Silt or Siltstone

WATER CONTENT



WATER LEVEL FOUND DURING DRILLING



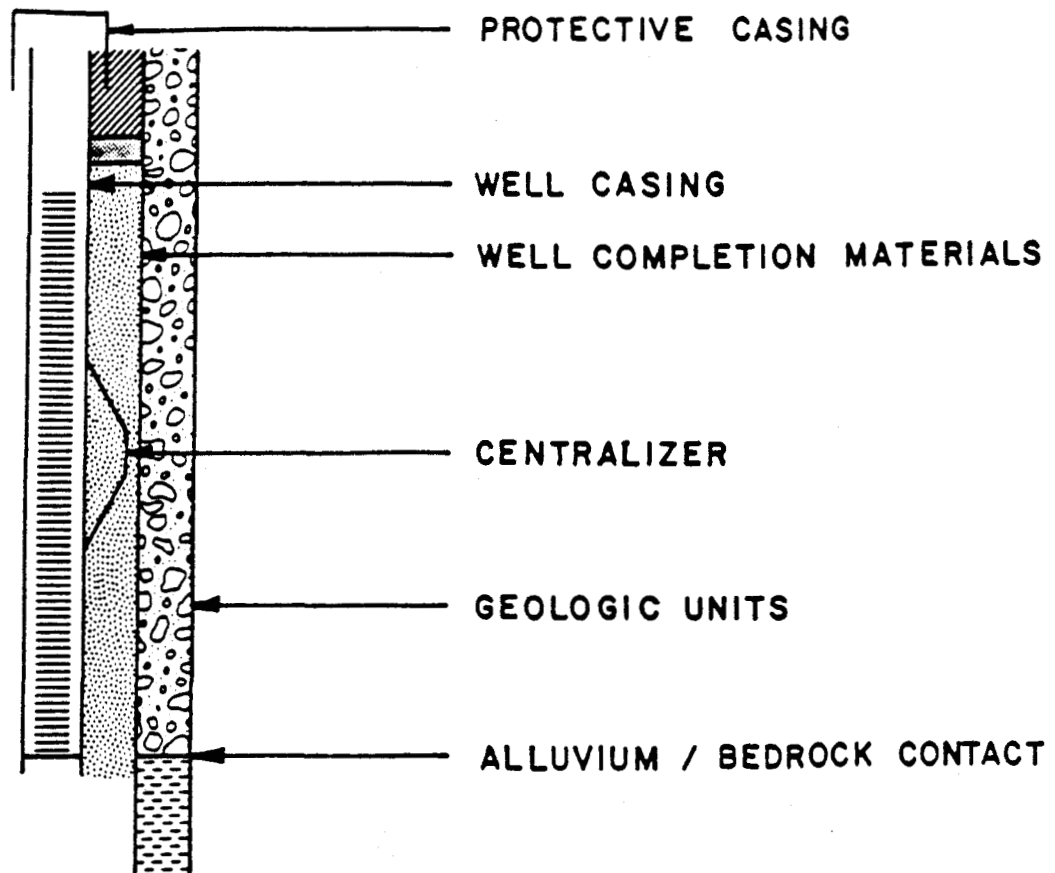
STATIC WATER LEVEL ON 10/13/88

PENETRATION RESISTANCE



STANDARD PENETRATION TEST RESULTS
BLOWS PER INCH.

EXPLANATION OF SYMBOLS ON
WELL CONSTRUCTION SUMMARIES



WELL CASING



BLANK



SCREEN

WELL COMPLETION MATERIALS



CEMENT GROUT



BENTONITE PELLETS



SAND PACK



CUTTINGS

GEOLOGIC MATERIALS

EXPLANATION PRESENTED IN LOG OF BORING
EXPLANATION.

INDEX OF DATA

Boring No.: 33-86

Completed as well? Yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☒ Well Development Summaries
- ☐ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

Project: Rocky Flats Plant

LOG OF BORING NO. 33-86

Date Drilled 9/10/86

Coordinates N 36960.9 E 21896.5

Boring Method Hollow Stem Auger

Ground Surface Elevation 5949.28'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	0			ROCKY FLATS ALLUVIUM					
	5			0-4.8'-Sample. Recovered 3.1/4.8' = 65%. GRAVEL: light olive gray (5Y 5/2) to olive gray (5Y 3/2); clayey silt and sand matrix; quartzite pebbles; poorly sorted; subangular; crumbles; dry.					
	10			4.8-6.8'-Sample. Recovered 2.0/2.0' = 100%. GRAVEL: light olive gray (5Y 5/2); clayey sand matrix; quartzite cobbles and gravel clasts; angular to subangular; moderate sorting; loose; dry.					
	15			ARAPAHOE FORMATION					
				6.8-11.8'-Sample. Recovered 5.0/5.0' = 100%. 6.8-7.0': GRAVEL: light olive gray (5Y 5/2); clayey sand matrix; quartzite cobbles and gravel clasts; angular to subangular; moderate sorting; loose; dry.					
	20			7.0-11.8': CLAYSTONE: grayish yellow green (5GY 7/2) to grayish olive green (5GY 3/2) with olive gray (5Y 3/2) to greenish gray (5GY 6/1) and dark yellowish orange (10YR 6/6) stains; well sorted; consolidated; fractured; firm; damp.					

Remarks

Logged by: T. Murphy

Checked by: 

Project No.

106P06222

Hydro-Search, Inc.

Page 1 of 2

Project: Rocky Flats Plant

LOG OF BORING NO. 33-86

Date Drilled 9/10/86

Coordinates N 36960.9 E 21896.5

Boring Method Hollow Stem Auger

Ground Surface Elevation 5949.28'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch)		Water Content (%)		Other Tests
					20	40	20	40	
	20								
	25								
	30								
	35			11.8-16.8'-Sample. Recovered 5.0/5.0'=100%. RQD 5.0/5.0'=100%. CLAYSTONE: grayish yellow green (5GY 7/2) to grayish olive green (5GY 3/2) with olive gray (5Y 3/2) to greenish gray (5GY 6/1) and dark yellowish orange (10YR 6/6) stains; well sorted; consolidated; fractured; firm; damp.					
	40			TOTAL DEPTH: 16.8'					

Remarks

Logged by: T. Murphy

Checked by: 

Project No.

106P06222

Hydro-Search, Inc.

Page 2 of 2

33-86

Dry

12 11/87

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
** Well Number: 3386			
09/12/86	-1.00	5950.70	
10/13/86	-1.00	5950.70	
11/26/86	-1.00	5950.70	
01/01/87	-1.00	5950.70	
02/25/87	-1.00	5950.70	
03/24/87	-1.00	5950.70	
05/08/87	-1.00	5950.70	
06/03/87	-1.00	5950.70	
07/08/87	-1.00	5950.70	
08/04/87	-1.00	5950.70	
09/03/87	-1.00	5950.70	
09/24/87	-1.00	5950.70	
09/24/87	-1.00	5950.70	
10/21/87	-1.00	5950.70	
11/09/87	-1.00	5950.70	
12/01/87	-1.00	5950.70	

INDEX OF DATA

Boring No.: 34-86

Completed as well? Yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☒ Well Development Summaries
- ☒ Hydraulic Conductivity Test Data
and Results
- ☒ Packer Test Data and Results
- ☒ Water Level Data

Project: Rocky Flats Plant

LOG OF BORING NO. 34-86

Date Drilled 8/20/86, 8/26/86, 8/28/86

Coordinates N 37171.4 E 23088.4

Boring Method Hollow Stem Auger/NC Core

Ground Surface Elevation 5910.44'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	0			VALLEY FILL					
				0-1.3'-Sample. Recovered 1.3/1.3'=100%. CLAY: grayish olive (10Y 4/2) to light olive gray (5Y 5/2) silty clay; some sand, gravel and cobbles; subrounded; poorly sorted; grasses at surface; dry.					
	5			2.0-4.0'-Sample. Recovered 1.9/2.0'=95%. SILTY CLAY: moderate to dark yellowish brown (10YR 6/2); white feldspar grains along with quartzite and granite particles; poorly sorted; subangular; few roots; dry.					
				4.0-7.0'-Sample. Recovered 0.0/3.0'=0%.					
	10			7.0-12.0'-Sample. Recovered 2.5/5.0'=50%. CLAYSTONE: olive gray (5Y 4/1); trace silt and sand; gravel lense at 8.6'; grades downward into light olive gray (5Y 5/2) clay; large subrounded cobble at bottom; soft; sticky; damp to moist.					
				12.0-17.0'-Sample. Recovered 2.7/5.0'=54%.					
	15			12.0-16.1'. GRAVEL: light olive gray (5Y 5/2) with abundant pink granite and quartzite; poorly sorted; angular to subangular; some sand; trace clay; wet.					
				ARAPAHOE FORMATION					
	20			16.1-17.0'. CLAYSTONE: dusky yellow (5Y 7/6); abundant medium light gray (N 6) horizontal mottles; well sorted; consolidated; firm; damp.					

Remarks

Logged by: T. Murphy & L. Pivonka

Checked by: 

Project No.

106P06222

Hydro-Search, Inc.

Page 1 of 6

Project: Rocky Flats Plant

LOG OF BORING NO. 34-86

Date Drilled 8/20/86, 8/26/86, 8/28/86

Coordinates N 37171.4 E 23088.4

Boring Method Hollow Stem Auger/NC Core

Ground Surface Elevation 5910.44'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	20			17.0-22.8'-Sample. Recovered 4.8/4.8'=100%. CLAYSTONE: light olive gray (5Y 5/2) clay with some silt; dark yellowish orange (10YR 6/6) mottles; well sorted; firm; damp.					
	25			22.8-27.8'-Sample. Recovered 5.0/5.0'=100%. CLAYSTONE: light olive gray (5Y 5/2); some silt; some dark yellowish orange (10YR 6/6) mottles; well sorted; firm; damp.					
	30			27.8-32.8'-Sample. Recovered 5.0/5.0'=100%. CLAYSTONE: light olive gray (5Y 5/2) and medium gray (N 5); limonite stains dark yellowish orange (10YR 6/6) abundant; black wood fragments common; trace silt and sand; iron stain along fractures; well sorted; firm; damp.					
	35			32.8-37.8'-Sample. Recovered 5.0/5.0'=100%. CLAYSTONE: olive gray (5Y 3/2) with minor dark yellowish orange (10YR 6/6) limonite stains; black wood fragments common; trace silt and sand; well sorted; firm; damp.					
	40			38.0-43.8'-Sample. Recovered 5.8/5.8'=100%. CLAYSTONE: dark gray (N 3); silty with trace of FeO stringers; some charcoal wood fragments; well sorted; consolidated; damp.					

Remarks

Logged by: T. Murphy & L. Pivonka

Checked by: 

Project No.

106P06222

Hydro-Search, Inc.

Page 2 of 6

Project: Rocky Flats Plant

LOG OF BORING NO. 34-86

Date Drilled 8/20/86, 8/26/86, 8/28/86

Coordinates N 37171.4 E 23088.4

Boring Method Hollow Stem Auger/NC Core

Ground Surface Elevation 5910.44'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	40			43.8-45.0'-Sample. Recovered 1.2/1.2'=100%. SANDSTONE: dark gray (N 3); clay-rich; greenish gray (5GY 6/1) clay; well sorted; consolidated; damp.					
	45			45.0-48.0'-Sample. Recovered 3.0/3.0'=100%. SANDSTONE: medium gray (N 5) laminated sandstone 0.5" thick with dark gray (N 3) claystone interbeds 0.1" thick; some of the thicker laminae contain coal material; very light gray (N 8) sandy clasts within the lower 1.5'; well sorted; consolidated; damp.					
	50			48.0-52.3'-Sample. Recovered 0.2/4.3'=5%. SANDSTONE: medium light gray (N 6); silty; laminated; well sorted; consolidated; damp.					
	55			52.3-53.4'-Sample. Recovered 1.1/1.1'=100%. SANDSTONE: medium light gray (N 6); silty; laminated; well sorted; consolidated; damp.					
	60			53.4-54.4'-Sample. Recovered 1.0/1.0'=100%. SANDSTONE: medium gray (N 5); laminated; well cemented with calcium carbonate; consolidated; damp.					

Remarks Logged by: T. Murphy & L. Pivonka

Checked by: *[Signature]*

Project No.
106P06222

Hydro-Search, Inc.

Page 3 of 6

Project: Rocky Flats Plant

LOG OF BORING NO. 34-86

Date Drilled 8/20/86, 8/26/86, 8/28/86

Coordinates N 37171.4 E 23088.4

Boring Method Hollow Stem Auger/NC Core

Ground Surface Elevation 5910.44'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	60			54.4-55.6'-Sample. Recovered 1.2/1.2'=100%. SANDSTONE: medium gray (N 5); laminated; well cemented with calcium carbonate; consolidated; damp.					
				55.6-59.3'-Sample. Recovered 3.7/3.7'=100%. CLAYSTONE: dark gray (N 3); variable quantities of silt and sand; abundant clay; consolidated; well sorted; firm; moist.					
	65			59.3-62.5'-Sample. Recovered 3.2/3.2'=100%. CLAYSTONE: dark gray (N 3); silty; light gray (N 7) mottling; firm; consolidated; well sorted; moist.					
				62.5-64.5'-Sample. Recovered 2.0/2.0'=100%. SANDSTONE: light gray (N 7) clay laminated sandstone; gradational contact; well sorted; consolidated; moist.					
	70			64.5-69.3'-Sample. Recovered 4.8/4.8'=100%. SANDSTONE: light gray (N 7) and medium light gray (N 6) silty sandstone with trace of wood fossils; sand content increases with depth; consolidated; well sorted; firm; dry.					
				69.3-71.0'-Sample. Recovered 1.7/1.7'=100%. CLAYSTONE: medium gray (N 5) silty and fine- grained sandy claystone; well sorted; firm; damp.					
	75								
	80								

Remarks

Logged by: T. Murphy & L. Pivonka

Checked by: 

Project No.

106P06222

Hydro-Search, Inc.

Page 4 of 6

Project: Rocky Flats Plant

LOG OF BORING NO. 34-86

Date Drilled 8/20/86, 8/26/86, 8/28/86

Coordinates N 37171.4 E 23088.4

Boring Method Hollow Stem Auger/NC Core

Ground Surface Elevation 5910.44'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	80			71.0-74.3'-Sample. Recovered 3.3/3.3'=100%. CLAYSTONE: dark gray (N 3); blocky texture; well sorted; firm; damp.					
				74.3-75.3'-Sample. Recovered 0.6/1.0'=60%. CLAYSTONE: dark gray (N 3); grayish orange (10YR 7/4) mottles; well sorted; consolidated; damp.					
	85			75.3-78.5'-Sample. Recovered 3.2/3.2'=100%. SANDSTONE: medium gray (N 5) silty sandstone; well sorted; consolidated; damp.					
				78.5-83.5'-Sample. Recovered 5.0/5.0'=100%. CLAYSTONE: medium dark gray (N 4); blocky texture; well sorted; consolidated; damp.					
	90			83.5-86.0'-Sample. Recovered 2.5/2.5'=100%. CLAYSTONE: medium dark gray (N 4); blocky texture; trace of pale yellowish orange (10YR 8/6) nodules; well sorted; consolidated; damp.					
				86.0-86.6'-Sample. Recovered 0.6/0.6'=100%. CLAYSTONE: medium dark gray (N 4); blocky texture; trace of pale yellowish orange (10YR 8/6) nodules; well sorted; consolidated; damp.					
	95			86.6-89.0'-Sample. Recovered 2.4/2.4'=100%. CLAYSTONE: greenish gray (5GY 6/1) silty sandstone with clay laminae; well sorted; consolidated; damp.					
	100								

Remarks

Logged by: T. Murphy & L. Pivonka

Checked by: *[Signature]*

Project No.

106P06222

Hydro-Search, Inc.

Page 5 of 6

Project: Rocky Flats Plant

LOG OF BORING NO.

Date Drilled
Boring Method

Coordinates
Ground Surface Elevation

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	100			96.0-100.0'-Sample. Recovered 4.0/4.0'=100%. CLAYSTONE: medium dark gray (N 4); gradational contact; some very fine- grained sand; well sorted; consolidated; damp. TOTAL DEPTH: 100.0'					
	105								
	110								
	115								
	120								

Remarks

Logged by:

Checked by: 

Project No.
106P06222

Hydro-Search, Inc.

Page 6 of 6

WELL CONSTRUCTION SUMMARY

LOCATION or COORDS: _____
 N 37171.4 E 23088.4

ELEVATION: GROUND LEVEL 5910.44'
 TOP OF CASING 5912.78'

DRILLING SUMMARY:

TOTAL DEPTH Well: 56.25' Hole: 100.00'
 BOREHOLE DIAMETER 0.00' - 37.80': 7½"
 37.80' - 100.00': 4 3/4"
 DRILLER Boyles Brothers Drilling Co.
 15865 W. 5th Avenue, Golden
 (David Jarvie, Jim Horn)
 RIG Mobile B-57
 BIT(S) 0.00' - 37.80': Blade bit
 37.80' - 100.00': Bull nose rock bit
 DRILLING FLUID None
 SURFACE CASING 5" x 40.8' steel w/ locking cap

WELL DESIGN:

BASIS: GEOLOGIC LOG ☒ GEOPHYSICAL LOG _____

CASING STRING(S): C=CASING S=SCREEN

0.00' 37.80' C1 _____

0.00' 44.24' C2 _____

44.24' 56.25' S1 _____

CASING: C1 5" I.D. steel

C2 2" I.D., Sch. 5 type 316 stain-
 less steel, threaded and flush
 jointed.

SCREEN: S1 2" I.D., Sch. 5 type 316 stain-
 less steel, threaded and flush
 jointed, 0.010" wire wrap screen,
 0.25' welded bottom cap.

CENTRALIZERS Type 304 stainless steel

22.47' - 23.70'

49.01' - 50.26'

FILTER MATERIAL 32-42 silica sand

43.00' - 56.50'

CEMENT Portland Type I

0.00' - 42.00' ; 90.00' - 64.50'

OTHER 3/8" bentonite pellets

42.00' - 43.00'

56.50' - 64.50'

CONSTRUCTION TIME LOG:

TASK	START		FINISH	
	DATE 1986	TIME	DATE 1986	TIME
DRILLING:				
7½" auger	8/20	1251	8/20	1545
4 3/4" core	8/26	1503	9/2	1202
GEOPHYS. LOGGING:	—	—	—	—
CASING:				
5" steel	8/21	0800	8/21	1335
2" stainless	9/3	0845	9/3	0900
FILTER PLACEMENT:	9/3	0900	9/3	1145
CEMENTING:	9/2	1604	9/2	1716
DEVELOPMENT:	9/5	1000	9/12	1015
OTHER:				
Cementing 5" casing	8/21	1359	8/21	1456
Lower cement	9/3	1150	9/3	1210
Bentonite	9/3	0823	9/3	0845
	9/3	1145	9/3	1150
Packer test	8/29	1056	8/29	1725

WELL DEVELOPMENT

See Well Development Summary Sheet

COMMENTS:

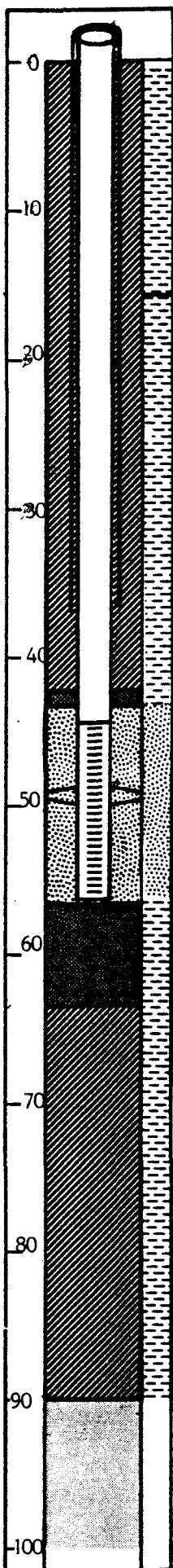
Water encountered at 48.0' during drilling

Top of stainless steel casing: 2.34'

Cave from T.D. to 90.0'

LOCATION Golden, CO
 PERSONNEL T. Murphy/L. Pivonka

PROJECT 106F06222
 Rocky Flats Plant



WELL 34-86

Hydro-Search, Inc. Reno • Denver

AQUIFER TEST DATA

WELL 34-86

Type of Aquifer Test: Bail down - Recovery
 How Q Measured: 4.5 gallon bucket
 How W.L.'s Measured: Olypic Well Sounder
 Measuring Point for W.L.'s: Top of Casing
 Elevation of Measuring Point: 5914.7

Project No.: 106P06222
 Location: Rocky Flats Plant
 Personnel: W. Herst, D. Pavlick

Depth of pump/airline: N/A

Start bailing: 9/29/86 Time: 0918:00

Stop bailing: 9/29/86 Time: 0940:00

Duration of Aquifer Test: 162 minutes

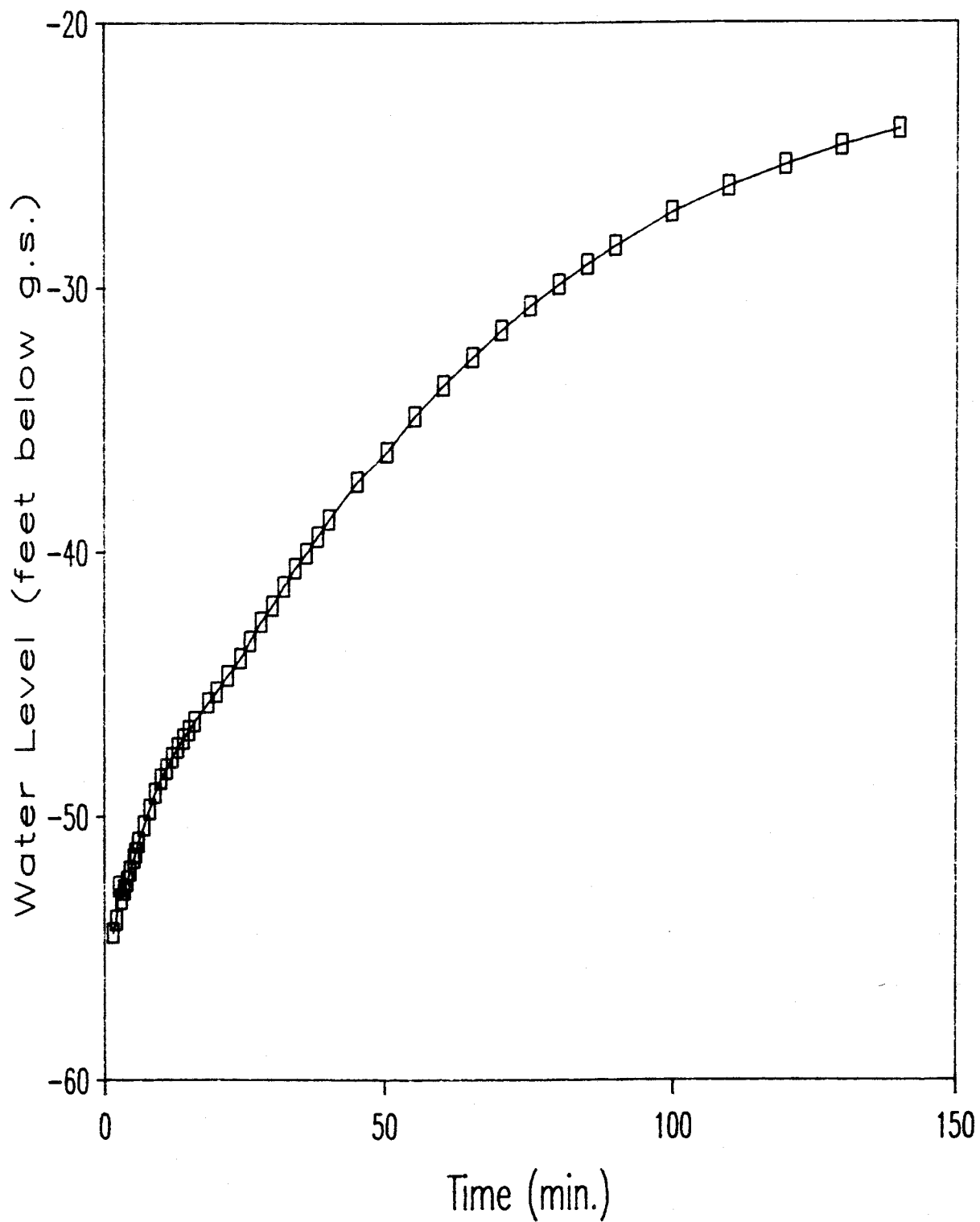
TIME		WATER LEVEL DATA		COMMENTS
t = 22	at t' = 0	Static Water Level: 20.80'		
t	t'	Water Level	Draw-down	
0		20.80		Begin bailing
3.3				Bailed 2 gallons
7.3				Bailed 2 gallons
12.1				Bailed 2 gallons
18.6				Bailed 2 gallons
22.0	0			Bailed 1 gallon,
23.5	1.5	54.39	33.59	stopped bailing
24.1	2.1	53.91	33.11	
24.6	2.6	52.64	31.84	
25.0	3.0	53.11	32.31	
25.5	3.5	52.77	31.97	
26.0	4.0	52.44	31.64	
26.5	4.5	52.06	31.26	
27.2	5.2	51.59	30.79	
27.5	5.5	51.37	30.57	
28.0	6.0	50.97	30.17	
29.0	7.0	50.35	29.55	
30.0	8.0	49.73	28.93	
31.0	9.0	49.11	28.31	
32.0	10.0	48.58	27.78	
33.0	11.0	48.20	27.40	
34.0	12.0	47.77	26.97	
35.0	13.0	47.40	26.60	
36.0	14.0	47.06	26.26	
37.0	15.0	46.75	25.95	
38.0	16.0	46.41	25.61	
40.5	18.5	45.69	24.89	
42.0	20.0	45.29	24.49	
44.0	22.0	44.68	23.88	
46.3	24.3	44.02	23.22	
48.0	26.0	43.37	22.57	
50.0	28.0	42.64	21.84	
52.0	30.0	42.03	21.23	
54.0	32.0	41.30	20.50	

56.0	34.0	40.62	19.82
58.0	36.0	40.05	19.25
60.0	38.0	39.42	18.62
62.0	40.0	38.77	17.97
67.0	45.0	37.33	16.53
72.2	50.2	36.21	15.41
77.0	55.0	34.85	14.05
82.0	60.0	33.68	12.88
87.0	65.0	32.62	11.82
92.0	70.0	31.60	10.80
97.0	75.0	30.68	9.88
102.0	80.0	29.87	9.07
107.0	85.0	29.12	8.32
112.0	90.0	28.42	7.62
122.0	100.0	27.15	6.35
132.0	110.0	26.18	5.38
142.0	120.0	25.36	4.56
152.0	130.0	24.64	3.84
162.0	140.0	24.02	3.22

90% recovered at
24.15'

AQUIFER TEST DATA

WELL 34-86



THIS PROGRAM CALCULATES MEAN TRANSMISSIVITIES FROM SLUG-TEST DATA BASED ON TWO ANALYTICAL APPROACHES:

- (1) METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS, 1967 (ARTICLE IN VOL.3, NO.1 OF WRR ENTITLED "RESPONSE OF A FINITE DIAMETER WELL TO AN INSTANTANEOUS CHARGE OF WATER")
- (2) METHOD OF BOUWER AND RICE, 1976 (ARTICLE IN VOL. 12, NO.3 OF WRR ENTITLED "A SLUG TEST FOR DETERMINING HYDRAULIC CONDUCTIVITY OF UNCONFINED AQUIFERS WITH COMPLETELY OR PARTIALLY PENETRATING WELLS")

PROJECT NO.: 6-0118-87

CLIENT: Rockwell International

SITE LOCATION: Rocky Flats Plant

DATE OF SLUG TEST: 10-14-87

FIELD INVESTIGATOR: Kevin McNeill

WELL NO.: 34-86

INPUT DATA ARE:

INNER CASING DIAMETER = 2.00 INCHES

LENGTH OF SCREEN OR INTAKE PORTION = 13.50 FEET

INNER SCREEN OR OPEN-HOLE DIAMETER = 2.00 INCHES

DEPTH FROM STATIC LEVEL TO BOTTOM OF SCREEN = 35.48 FEET

DIAMETER OF DRILLED HOLE = 4.75 INCHES

THICKNESS OF SATURATED AQUIFER ZONE = 10.60 FEET

ESTIMATED POROSITY OF GRAVEL PACK = .25

FALLING-HEAD INDEX = 0 ('1' IF FALLING, '0' IF RISING)

NUMBER OF HEAD-TIME DATA POINTS = 36

TIME (sec)	HEAD (FEET)
1.00	1.250
2.00	1.240
3.00	1.240
4.00	1.240
5.00	1.240
6.00	1.240
7.00	1.230
8.00	1.230
9.00	1.230
10.00	1.230
15.00	1.220
20.00	1.210
50.00	1.190
80.00	1.170
110.00	1.150
140.00	1.130
170.00	1.110
200.00	1.100
230.00	1.090
260.00	1.070
290.00	1.060
320.00	1.050
380.00	1.020
440.00	1.000
500.00	.980
560.00	.960
620.00	.940
740.00	.900
860.00	.860
980.00	.830
1100.00	.800
1220.00	.770
1470.00	.720
1820.00	.650

2180.00 .600
2540.00 .550

H0 WAS COMPUTED FROM INTERCEPT OF PLOT OF LOG(H) VS. TIME

SUCCESSIVE COMPUTED
VALUES FOR H0
(FEET)

1.1992
1.2046

METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS

COMPUTED RESULTS:

COMPUTED VALUE OF H0 = 1.26 FEET

NOTE: TRANSMISSIVITY UNITS ARE IN FT**2/sec AND PERMEABILITY UNITS ARE IN FT/sec

ALPHA	STORATIVITY	MEAN TRANSMIS- SIVITY	MEAN PERMEA- BILITY	MINIMUM TRANS.	MAXIMUM TRANS.	RATIO OF "T" RANGE TO TBAR	ROOT MEAN SQUARE OF TIME DEVIATIONS	DIFFERENCE IN RMS
1.000E-01	1.000E-01	1.219E-06	1.150E-07	8.062E-07	2.973E-06	1.777096	165.06	.00
1.000E-02	1.000E-02	4.525E-06	4.269E-07	2.982E-06	1.407E-05	2.449227	265.58	-100.53
1.000E-03	1.000E-03	1.139E-05	1.074E-06	4.444E-06	4.553E-05	3.607872	471.85	-206.27
1.000E-04	1.000E-04	1.970E-05	1.858E-06	5.893E-06	8.584E-05	4.058690	544.15	-72.29
1.000E-05	1.000E-05	2.804E-05	2.646E-06	7.311E-06	1.284E-04	4.317917	574.94	-30.79
1.000E-06	1.000E-06	3.622E-05	3.417E-06	8.713E-06	1.726E-04	4.530688	591.00	-16.07
1.000E-07	1.000E-07	4.424E-05	4.173E-06	1.010E-05	2.162E-04	4.659535	600.79	-9.78
1.000E-08	1.000E-08	5.214E-05	4.919E-06	1.148E-05	2.589E-04	4.744845	607.35	-6.56
1.000E-09	1.000E-09	6.000E-05	5.660E-06	1.284E-05	3.016E-04	4.812938	612.13	-4.79
1.000E-10	1.000E-10	6.778E-05	6.394E-06	1.421E-05	3.427E-04	4.847080	615.68	-3.55

METHOD OF BOWER AND RICE

COMPUTED RESULTS USING DIAMETER OF DRILLED HOLE:

PERMEABILITY = 3.50E-07 FT/sec = 1.07E-05 CM/sec

TRANSMISSIVITY = 3.71E-06 FT**2/sec

COMPUTED RESULTS USING DIAMETER OF CASING AND SCREEN:

PERMEABILITY = $4.18\text{E-}07$ FT/sec = $1.27\text{E-}05$ CM/sec

TRANSMISSIVITY = $4.43\text{E-}06$ FT²/sec

WELL NO.: 34-86

INPUT DATA ARE:

INNER CASING DIAMETER = 2.00 INCHES

INNER SCREEN OR OPEN-HOLE DIAMETER = 2.00 INCHES

DIAMETER OF DRILLED HOLE = 4.75 INCHES

ESTIMATED POROSITY OF GRAVEL PACK = .25

LENGTH OF SCREEN OR INTAKE PORTION = 13.50 FEET

DEPTH FROM STATIC LEVEL TO BOTTOM OF SCREEN = 35.48 FEET

THICKNESS OF SATURATED AQUIFER ZONE = 10.60 FEET

FALLING-HEAD INDEX = 0 ("1" IF FALLING, "0" IF RISING)

NUMBER OF HEAD-TIME DATA POINTS = 36

TIME (sec)	HEAD (FEET)
1.00	1.250
2.00	1.240
3.00	1.240
4.00	1.240
5.00	1.240
6.00	1.240
7.00	1.230
8.00	1.230
9.00	1.230
10.00	1.230
15.00	1.220
20.00	1.210
50.00	1.190
80.00	1.170
110.00	1.150
140.00	1.130
170.00	1.110
200.00	1.100
230.00	1.090
260.00	1.070
290.00	1.060
320.00	1.050
380.00	1.020
440.00	1.000
500.00	.980
560.00	.960
620.00	.940
740.00	.900
860.00	.860
980.00	.830

1100.00	.800
1220.00	.770
1470.00	.720
1820.00	.650
2180.00	.600
2540.00	.550

H0 WAS COMPUTED FROM KNOWN VOLUME OF SLUG

VOLUME OF SLUG ENTERED = .03270 CUBIC FEET

METHOD OF COOPER, BREDEHOEFT AND PAPADOPOULOS

COMPUTED RESULTS:

COMPUTED VALUE OF H0 = 1.50 FEET

NOTE: TRANSMISSIVITY UNITS ARE IN FT**2/sec

AND PERMEABILITY UNITS ARE IN FT/sec

ALPHA	STORATIVITY	MEAN TRANSMIS- SIVITY	MEAN PERMEA- BILITY	MINIMUM TRANS.	MAXIMUM TRANS.	RATIO OF "T" RANGE TO TBAR	ROOT MEAN SQUARE OF TIME DEVIATIONS	DIFFERENCE IN RMS
1.000E-01	1.000E-01	2.996E-05	2.826E-06	2.116E-06	3.056E-04	10.129200	745.51	.00
1.000E-02	1.000E-02	9.116E-05	8.600E-06	3.831E-06	9.570E-04	10.455520	766.23	-20.73
1.000E-03	1.000E-03	1.667E-04	1.573E-05	5.632E-06	1.772E-03	10.594520	772.84	-6.60
1.000E-04	1.000E-04	2.427E-04	2.290E-05	7.354E-06	2.593E-03	10.654160	775.54	-2.70
1.000E-05	1.000E-05	3.169E-04	2.990E-05	9.060E-06	3.395E-03	10.685580	776.88	-1.33
1.000E-06	1.000E-06	3.897E-04	3.677E-05	1.075E-05	4.183E-03	10.704240	777.68	-.80
1.000E-07	1.000E-07	4.616E-04	4.355E-05	1.241E-05	4.959E-03	10.716130	778.21	-.53
1.000E-08	1.000E-08	5.328E-04	5.026E-05	1.407E-05	5.728E-03	10.724790	778.59	-.38
1.000E-09	1.000E-09	6.035E-04	5.693E-05	1.572E-05	6.492E-03	10.731120	778.87	-.28
1.000E-10	1.000E-10	6.737E-04	6.356E-05	1.736E-05	7.251E-03	10.736540	779.09	-.22

PACKER TEST ANALYSIS
 WELL NO. 34-86
 ROCKY FLATS PLANT JOB NO. 106P06222
 DATE TESTED: 8/29/86 BY: L. PIVONKA
 TEST INTERVAL (FEET BELOW G.S.): 46.01 - 56.00
 MATERIAL TESTED: ARAPAHOE SANDSTONE
 DEPTH TO WATER (FEET BELOW G.S.): 20.46

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00165170 (FEET³/MIN)
 L = LENGTH OF TEST INTERVAL = 9.99 FEET
 TEST INTERVAL IS BELOW WATER TABLE
 HEAD = DEPTH TO WATER + GAGE HEIGHT
 + GAGE PRESSURE (IN FEET)
 = 20.46 + 3.30 + 3.50 * 2.31 = 31.84
 R = BOREHOLE RADIUS = .16 FEET
 K = HYDRAULIC CONDUCTIVITY = .00000341 FT/MIN
 K = .00000173 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00000000 (FEET³/MIN)
 L = LENGTH OF TEST INTERVAL = 9.99 FEET
 TEST INTERVAL IS BELOW WATER TABLE
 HEAD = DEPTH TO WATER + GAGE HEIGHT
 + GAGE PRESSURE (IN FEET)
 = 20.46 + 3.30 + 10.00 * 2.31 = 46.86
 R = BOREHOLE RADIUS = .16 FEET
 K = HYDRAULIC CONDUCTIVITY = .00000000 FT/MIN
 K = .00000000 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00601109 (FEET³/MIN)
 L = LENGTH OF TEST INTERVAL = 9.99 FEET
 TEST INTERVAL IS BELOW WATER TABLE
 HEAD = DEPTH TO WATER + GAGE HEIGHT
 + GAGE PRESSURE (IN FEET)
 = 20.46 + 3.30 + 3.50 * 2.31 = 31.84
 R = BOREHOLE RADIUS = .16 FEET
 K = HYDRAULIC CONDUCTIVITY = .00001240 FT/MIN
 K = .00000630 CM/SEC

PACKER TEST ANALYSIS
 WELL NO. 34-86
 ROCKY FLATS PLANT JOB NO. 106P06222
 DATE TESTED: 8/29/86 BY: L. PIVONKA
 TEST INTERVAL (FEET BELOW G.S.): 55.01 - 65.00
 MATERIAL TESTED: ARAPAHOE CLAYSTONE
 DEPTH TO WATER (FEET BELOW G.S.): 20.46

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00380432 (FEET³/MIN)
 L = LENGTH OF TEST INTERVAL = 9.99 FEET
 TEST INTERVAL IS BELOW WATER TABLE
 HEAD = DEPTH TO WATER + GAGE HEIGHT
 + GAGE PRESSURE (IN FEET)
 = 20.46 + 3.30 + 3.00 * 2.31 = 30.69
 R = BOREHOLE RADIUS = .16 FEET

K = HYDRAULIC CONDUCTIVITY = .00000815 FT/MIN
 K = .00000414 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00902772 (FEET³/MIN)
 L = LENGTH OF TEST INTERVAL = 9.99 FEET
 TEST INTERVAL IS BELOW WATER TABLE
 HEAD = DEPTH TO WATER + GAGE HEIGHT
 + GAGE PRESSURE (IN FEET)
 = 20.46 + 3.30 + 12.50 * 2.31 = 52.63
 R = BOREHOLE RADIUS = .16 FEET

K = HYDRAULIC CONDUCTIVITY = .00001127 FT/MIN
 K = .00000573 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00143508 (FEET³/MIN)
 L = LENGTH OF TEST INTERVAL = 9.99 FEET
 TEST INTERVAL IS BELOW WATER TABLE
 HEAD = DEPTH TO WATER + GAGE HEIGHT
 + GAGE PRESSURE (IN FEET)
 = 20.46 + 3.30 + 3.00 * 2.31 = 30.69
 R = BOREHOLE RADIUS = .16 FEET

K = HYDRAULIC CONDUCTIVITY = .00000307 FT/MIN
 K = .00000156 CM/SEC

PACKER TEST ANALYSIS
 WELL NO. 34-86
 ROCKY FLATS PLANT JOB NO. 106F06222
 DATE TESTED: 8/29/86 BY: L. PIVONKA
 TEST INTERVAL (FEET BELOW G.S.): 76.71 - 86.70
 MATERIAL TESTED: ARAPAHOE CLAYSTONE
 DEPTH TO WATER (FEET BELOW G.S.): 20.46

$$K = \frac{Q}{2(P_1)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00077169 (FEET³/MIN)
 L = LENGTH OF TEST INTERVAL = 9.99 FEET
 TEST INTERVAL IS BELOW WATER TABLE
 HEAD = DEPTH TO WATER + GAGE HEIGHT
 + GAGE PRESSURE (IN FEET)
 = 20.46 + 3.30 + 13.50 * 2.31 = 54.94
 R = BOREHOLE RADIUS = .16 FEET

 K = HYDRAULIC CONDUCTIVITY = .00000092 FT/MIN
 K = .00000047 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00000000 (FEET³/MIN)
 L = LENGTH OF TEST INTERVAL = 9.99 FEET
 TEST INTERVAL IS BELOW WATER TABLE
 HEAD = DEPTH TO WATER + GAGE HEIGHT
 + GAGE PRESSURE (IN FEET)
 = 20.46 + 3.30 + .00 * 2.31 = 23.76
 R = BOREHOLE RADIUS = .16 FEET

 K = HYDRAULIC CONDUCTIVITY = .00000000 FT/MIN
 K = .00000000 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00000000 (FEET³/MIN)
 L = LENGTH OF TEST INTERVAL = 9.99 FEET
 TEST INTERVAL IS BELOW WATER TABLE
 HEAD = DEPTH TO WATER + GAGE HEIGHT
 + GAGE PRESSURE (IN FEET)
 = 20.46 + 3.30 + .00 * 2.31 = 23.76
 R = BOREHOLE RADIUS = .16 FEET

 K = HYDRAULIC CONDUCTIVITY = .00000000 FT/MIN
 K = .00000000 CM/SEC

PAC-ER TEST ANALYSIS

WELL NO. 34-86

ROCKY FLATS PLANT JOB NO. 106P06222

DATE TESTED: 8/29/86 BY: L. PIVONKA

TEST INTERVAL (FEET BELOW G.S.): 85.10 - 95.09

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 20.46

$$K = \frac{Q}{2(P1)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00054154 (FEET3/MIN)

L = LENGTH OF TEST INTERVAL = 9.99 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 20.46 + 2.80 + 4.00 * 2.31 = 32.50

R = BOREHOLE RADIUS = .16 FEET

K = HYDRAULIC CONDUCTIVITY = .00000109 FT/MIN

K = .00000056 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00860736 (FEET3/MIN)

L = LENGTH OF TEST INTERVAL = 9.99 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 20.46 + 2.80 + 19.00 * 2.31 = 67.15

R = BOREHOLE RADIUS = .16 FEET

K = HYDRAULIC CONDUCTIVITY = .00000842 FT/MIN

K = .00000428 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00000000 (FEET3/MIN)

L = LENGTH OF TEST INTERVAL = 9.99 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 20.46 + 2.80 + 4.00 * 2.31 = 32.50

R = BOREHOLE RADIUS = .16 FEET

K = HYDRAULIC CONDUCTIVITY = .00000000 FT/MIN

K = .00000000 CM/SEC

12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
** Well Number: 3486			
09/05/86	22.38	5912.78	5890.40
09/08/86	22.40	5912.78	5890.38
09/09/86	22.63	5912.78	5890.15
09/10/86	22.77	5912.78	5890.01
09/11/86	23.48	5912.78	5889.30
09/12/86	24.25	5912.78	5888.53
10/13/86	22.96	5912.78	5889.82
11/26/86	22.77	5912.78	5890.01
01/01/87	22.38	5912.78	5890.40
02/01/87	22.17	5912.78	5890.61
03/17/87	22.05	5912.78	5890.73
05/08/87	21.98	5912.78	5890.80
06/02/87	22.80	5912.78	5889.98
07/07/87	21.65	5912.78	5891.13
07/27/87	22.10	5912.78	5890.68
08/04/87	22.40	5912.78	5890.38
09/01/87	22.20	5912.78	5890.58
09/29/87	22.40	5912.78	5890.38
11/03/87	23.50	5912.78	5889.28
12/01/87	22.26	5912.78	5890.52

INDEX OF DATA

Boring No.: 35-86

Completed as well? Yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☒ Well Development Summaries
- ☒ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

Project: Rocky Flats Plant

LOG OF BORING NO. 35-86

Date Drilled 8/19/86

Coordinates N 37177.0 E 23114.4

Boring Method Hollow Stem Auger

Ground Surface Elevation 5909.2

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	0			VALLEY FILL ALLUVIUM					
				0-2.0'-Sample. Recovered 2.0/2.0'=100%. CLAY: olive gray (5Y 3/2); dark yellowish orange (10YR 6/6) mottles; grades downward into dark yellowish brown (10YR 4/2) clay; some silt; trace gravel and cobble size clasts of quartzite and granite; subangular to subrounded; dry to damp.					
	5			2.0-2.7'-Sample. Recovered 0.7/0.7'=100%. CLAY: dark yellowish brown (10YR 4/2); dark yellowish orange (10YR 6/6) mottles common; some silt; trace gravel and cobble size clasts of quartzite and granite; subangular to subrounded; dry to damp.					
	10			2.7-3.7'-Sample. Recovered 0.0/0.7'=0%. 3.7-5.7'-Sample. Recovered 2.0/2.0'=100%. 3.7-5.0'. CLAY: dark yellowish brown (10YR 4/2); dark yellowish orange (10YR 6/6) mottles common; some silt; trace gravel and cobble size clasts of quartzite and granite; subangular to subrounded; dry to damp.					
	15			5.0-5.7'. CLAY: light olive gray (5Y 5/2); silty; well sorted; consolidated; firm; damp to moist. 5.7-6.5'. No sample. Depth correction.					
	20			6.5-8.5'-Sample. Recovered 1.7/2.0'=85%. CLAY: olive black (5Y 2/1); silt; trace sand and gravel; moderately well sorted; soft; wet.					

Remarks Logged by: T. Murphy

Checked by: 

Project No.

106P06222

Hydro-Search, Inc.

Page 1 of 2

Project: Rocky Flats Plant

LOG OF BORING NO. 35-86

Date Drilled 8/19/86

Coordinates N 37177.0 E 23114.4

Boring Method Hollow Stem Auger

Ground Surface Elevation 5909.2

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch)		Water Content (%)		Other Tests
					20	40	20	40	
	20			8.5-10.5'-Sample. Recovered 2.0/2.0'=100%. CLAY: olive black (5Y 2/1) to light olive gray (5Y 5/2); silty with gravel lenses; trace fine-grained sand; poorly sorted; subangular; firm; wet.					
	25			ARAPAHOE FORMATION					
				10.5-12.5'-Sample. Recovered 2.0/2.0'=100%. CLAY: light olive gray (5Y 5/2); dark yellowish orange (10YR 6/6) mottles; sand layer at 12.0-12.5'; fine-grained; silty; moist; firm.					
	30			12.5-14.0'-Sample. Recovered 1.5/1.5'=100%. CLAYSTONE: light olive gray (5Y 5/2); dark yellowish orange (10YR 6/6) mottles; no gravel; silty; firm; moist.					
				14.0-16.0'-Sample. Recovered 2.0/2.0'=100%. CLAYSTONE: light olive gray (5Y 5/2); dark yellowish orange (10YR 6/6) mottles; no gravel; silty; layers of ironstone; firm; moist.					
	35			16.0-18.0'-Sample. Recovered 1.8/2.0'=90%. CLAYSTONE: pale olive (10Y 6/2) to light olive gray (5Y 5/2); minor dark yellowish orange (10YR 6/6) mottling; apparent bedding due to color variations; firm; damp to moist.					
	40			TOTAL DEPTH: 18.0'					

Remarks

Logged by: T. Murphy

Checked by: 

Project No.

106P06222

Hydro-Search, Inc.

Page 2 of 2

WELL CONSTRUCTION SUMMARY

LOCATION or COORDS: _____

N 37177.0 E 23114.4

ELEVATION: GROUND LEVEL 5909.20'

TOP OF CASING 5911.54'

DRILLING SUMMARY:

TOTAL DEPTH Well: 11.60' Hole: 18.00'

BOREHOLE DIAMETER 7 1/4"

DRILLER Boyles Brothers Drilling Co.
15865 W. 5th Avenue

Golden, CO (Dave Jarvie)

RIG Mobile B-57

BIT(S) T5

DRILLING FLUID None

SURFACE CASING 5" x 5' steel w/ locking
cap

WELL DESIGN:

BASIS: GEOLOGIC LOG ☒ GEOPHYSICAL LOG _____

CASING STRING(S): C=CASING S=SCREEN

0.00'	4.86'	C1	_____
4.86'	11.60'	S1	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

CASING: C1 2" I.D. Sch. 5 type 316 stain-
C2 less steel, threaded and flush
C3 jointed.
C4 _____SCREEN: S1 2" I.D. Sch. 5 type 316 stain-
S2 less steel, threaded and flush
S3 jointed, 0.010" wire wrap screen
S4 0.25' welded bottom cap.CENTRALIZERS Type 304 stainless steel
7.80' - 8.85'FILTER MATERIAL 16-40 silica sand
2.90' - 12.60'CEMENT Portland Type I
0.00' - 1.95'OTHER 3/8" bentonite pellets
1.95' - 2.90'
12.60' - 14.20'

CONSTRUCTION TIME LOG:

TASK	START		FINISH	
	DATE 1986	TIME	DATE 1986	TIME
DRILLING: 7 1/4" auger	8/19	1258	8/19	1558
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
GEOPHYS. LOGGING:	—	—	—	—
CASING: 2" stainless	8/20	1012	8/20	1015
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
FILTER PLACEMENT:	8/20	1015	8/10	1020
CEMENTING:	8/20	1025	8/20	1040
DEVELOPMENT:	9/3	1000	9/11	1155
OTHER: Bentonite	8/20	1020	8/20	1025
_____	8/20	1008	8/20	1012
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

WELL DEVELOPMENT

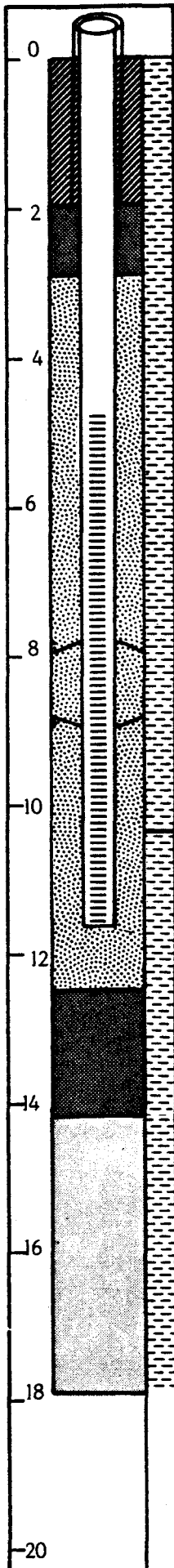
See Well Development Summary Sheet.

COMMENTS:

Water encountered at 8.0' during drilling.

Top of stainless steel casing: 2.34'

Cave from TD to 14.20'

LOCATION Golden, CO
PERSONNEL T. MurphyPROJECT 106R06222
Rocky Flats Plant

WELL 35-86

[illegible]

AQUIFER TEST DATA WELL 35-86

Type of Aquifer Test: Bail down - Recovery Project No.: 106P06222
 How Q Measured: 4.5 gallon bucket Location: Rocky Flats Plant
 How W.L.'s Measured: Olympic Well Sounder Personnel: W. Herst, D. Pavlick
 Measuring Point for W.L.'s: Top of Casing
 Elevation of Measuring Point: 5914.62'

Depth of pump/airline: N/A
 Start bailing: 9/25/86 Time: 1255:00
 Stop bailing: 9/25/86 Time: 1301:00
 Duration of Aquifer Test: 110 minutes

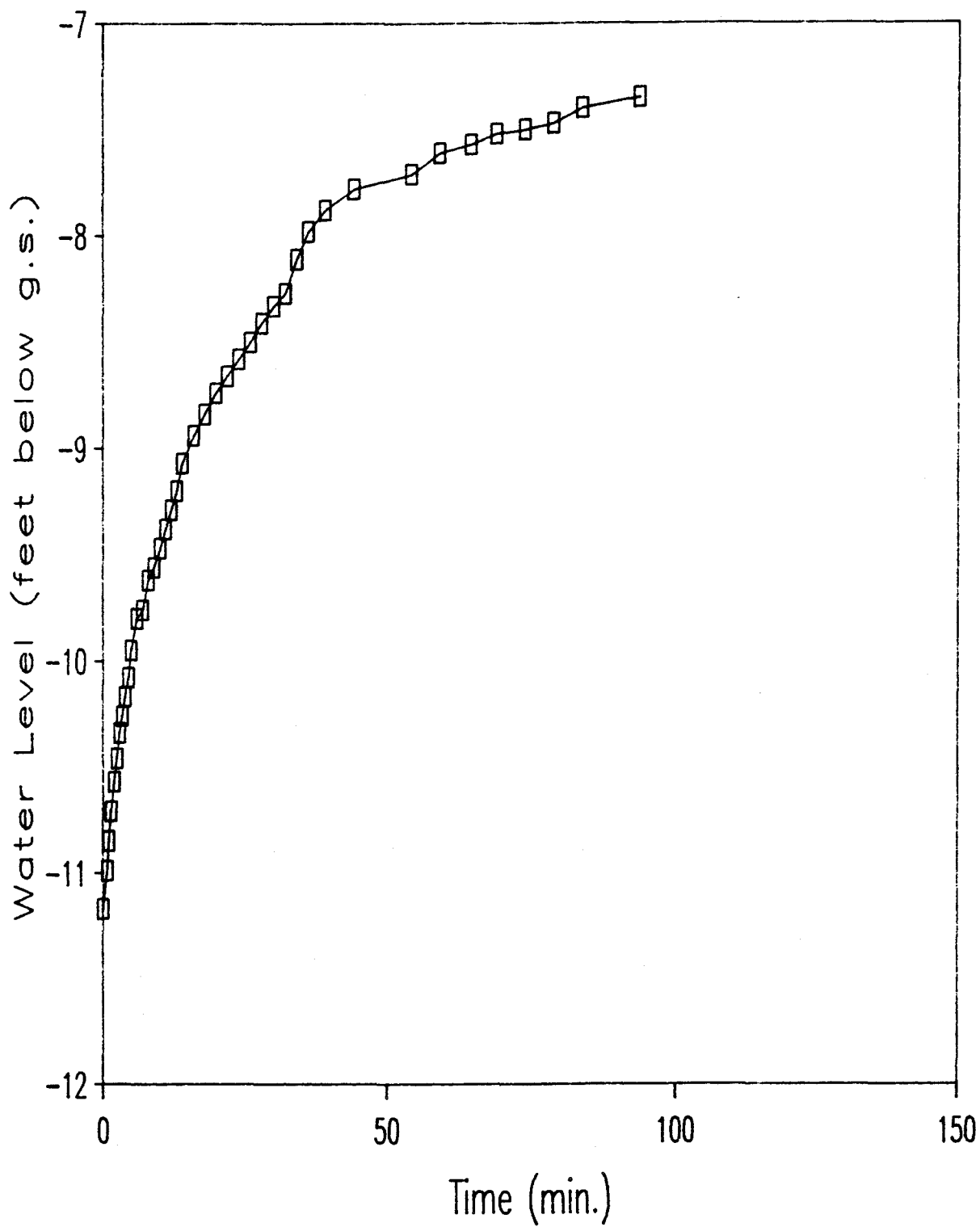
TIME		WATER LEVEL DATA		COMMENTS
t = 6	at t' = 0	Static Water Level: 6.94		
t	t'	Water Level	Draw-down	
0		6.94		Begin bailing
.8				Bailed 1 gallon
4.5				Bailed 0.5 gallon
6.0	0			Stop bailing
6.8	.8	11.17	4.23	
7.1	1.1	10.99	4.05	Total depth = 11.64
7.5	1.5	10.85	3.91	
8.0	2.0	10.71	3.77	
8.5	2.5	10.57	3.63	
9.0	3.0	10.46	3.52	
9.5	3.5	10.34	3.40	
10.0	4.0	10.26	3.32	
10.5	4.5	10.17	3.23	
11.0	5.0	10.08	3.14	
12.0	6.0	9.95	3.01	
13.0	7.0	9.80	2.86	
14.0	8.0	9.76	2.82	
15.0	9.0	9.62	2.68	
16.0	10.0	9.56	2.62	
17.0	11.0	9.47	2.53	
18.0	12.0	9.38	2.44	
19.0	13.0	9.29	2.35	
20.0	14.0	9.20	2.26	
22.0	16.0	9.07	2.13	
24.0	18.0	8.94	2.00	
26.0	20.0	8.84	1.90	
28.0	22.0	8.74	1.80	
30.0	24.0	8.66	1.72	
32.0	26.0	8.58	1.64	
34.0	28.0	8.50	1.56	
36.0	30.0	8.41	1.47	
38.0	32.0	8.33	1.39	
40.0	34.0	8.27	1.33	
42.0	36.0	8.11	1.17	

45.0	39.0	7.98	1.04
50.0	44.0	7.88	.94
60.0	54.0	7.78	.84
65.0	59.0	7.71	.77
70.5	64.5	7.61	.67
75.0	69.0	7.57	.63
80.0	74.0	7.52	.58
85.0	79.0	7.50	.56
90.0	84.0	7.47	.53
100.0	94.0	7.40	.46
110.0	104.0	7.35	.41

90% recovered at
7.41'

AQUIFER TEST DATA

WELL 35-86



PROGRAM SLUGT, VERSION 4, OCT. 1985

THIS PROGRAM CALCULATES MEAN TRANSMISSIVITIES FROM SLUG-TEST DATA BASED ON TWO ANALYTICAL APPROACHES:
(1) METHOD OF COOPER, BREDEHOEFT AND PAPADOPULOS, 1967 (ARTICLE IN VOL.3, NO.1 OF WRR ENTITLED
"RESPONSE OF A FINITE DIAMETER WELL TO AN INSTANTANEOUS CHARGE OF WATER")
(2) METHOD OF BOUWER AND RICE, 1976 (ARTICLE IN VOL. 12, NO.3 OF WRR ENTITLED
"A SLUG TEST FOR DETERMINING HYDRAULIC CONDUCTIVITY OF UNCONFINED AQUIFERS
WITH COMPLETELY OR PARTIALLY PENETRATING WELLS")

PROJECT NO.: 6-011B-87

CLIENT: Rockwell International

SITE LOCATION: Rocky Flats Plant

DATE OF SLUG TEST: 10-14-87

FIELD INVESTIGATOR: Kevin McNeill

WELL NO.: 35-B6

INPUT DATA ARE:

INNER CASING DIAMETER = 2.00 INCHES

LENGTH OF SCREEN OR INTAKE PORTION = 4.59 FEET

INNER SCREEN OR OPEN-HOLE DIAMETER = 2.00 INCHES

DEPTH FROM STATIC LEVEL TO BOTTOM OF SCREEN = 4.59 FEET

DIAMETER OF DRILLED HOLE = 7.25 INCHES

THICKNESS OF SATURATED AQUIFER ZONE = 4.59 FEET

ESTIMATED POROSITY OF GRAVEL PACK = .25

FALLING-HEAD INDEX = 0 ("1" IF FALLING, "0" IF RISING)

NUMBER OF HEAD-TIME DATA POINTS = 39

TIME (sec)	HEAD (FEET)
1.00	.630
2.00	.610
3.00	.600
4.00	.590
5.00	.590
6.00	.580
7.00	.570
8.00	.560
9.00	.560
10.00	.550
15.00	.520
20.00	.500
25.00	.480
35.00	.440
45.00	.410
55.00	.380
65.00	.360
85.00	.320
105.00	.300
125.00	.280
145.00	.270
175.00	.250
205.00	.240
235.00	.230
265.00	.230
295.00	.220
355.00	.210
415.00	.200
535.00	.190
655.00	.170
775.00	.160
895.00	.150
1015.00	.150
1135.00	.140
1465.00	.120
1945.00	.110
2425.00	.100
2905.00	.090
3505.00	.080

HO WAS COMPUTED FROM INTERCEPT OF PLOT OF LOG(H) VS. TIME

SUCCESSIVE COMPUTED
VALUES FOR HO
(FEET)

.3883
.3987

.....

METHOD OF BOUWER AND RICE

COMPUTED RESULTS USING DIAMETER OF DRILLED HOLE:

PERMEABILITY = $4.57\text{E-}06$ FT/sec = $1.39\text{E-}04$ CM/sec

TRANSMISSIVITY = $2.10\text{E-}05$ FT**2/sec

COMPUTED RESULTS USING DIAMETER OF CASING AND SCREEN:

PERMEABILITY = $1.75\text{E-}06$ FT/sec = $5.34\text{E-}05$ CM/sec

TRANSMISSIVITY = $8.04\text{E-}06$ FT**2/sec

12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
** Well Number: 3586			
09/03/86	9.35	5911.54	5902.19
09/08/86	9.04	5911.54	5902.50
09/09/86	9.14	5911.54	5902.40
09/10/86	9.16	5911.54	5902.38
09/11/86	9.24	5911.54	5902.30
09/12/86	9.29	5911.54	5902.25
10/13/86	9.13	5911.54	5902.41
11/26/86	9.47	5911.54	5902.07
01/01/87	9.38	5911.54	5902.16
02/01/87	8.96	5911.54	5902.58
03/17/87	6.50	5911.54	5905.04
05/08/87	6.00	5911.54	5905.54
06/02/87	7.90	5911.54	5903.64
07/07/87	6.70	5911.54	5904.84
07/27/87	8.10	5911.54	5903.44
08/04/87	6.40	5911.54	5905.14
09/01/87	8.60	5911.54	5902.94
09/29/87	9.00	5911.54	5902.54
11/03/87	8.80	5911.54	5902.74
12/01/87	8.40	5911.54	5903.14

INDEX OF DATA

Boring No.: 36-86

Completed as well? Yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☒ Well Development Summaries
- ☐ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

Project: Rocky Flats Plant

LOG OF BORING NO. 36-86

Date Drilled 8/25/86

Coordinates N 37395.4 E 23715.3


Boring Method Hollow Stem Auger

Ground Surface Elevation 5881.94

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	0			VALLEY FILL ALLUVIUM 0-0.3'-Sample. Recovered 0.3/0.3'=100%. CLAY: moderate yellowish brown (10YR 5/4); silty; poorly sorted; unconsolidated; damp.					
				0.3-4.3'-Sample. Recovered 2.0/4.0'=50%. CLAY: light brown (5YR 5/6) and dark yellowish brown (10YR 4/2); silty; some granitic cobbles; trace iron concretions; poorly sorted; unconsolidated; damp.					
	5			4.3-5.5'-Sample. Recovered 0.9/1.2'=75%. GRAVEL: dark yellowish brown (10YR 4/2); granitic pebbles and cobbles; silty and clayey; trace iron concretions; poorly sorted; unconsolidated; damp.					
	10			ARAPAHOE FORMATION 5.5-8.0'-Sample. Recovered 2.5/2.5'=100%. CLAYSTONE: medium light gray (N 6) and light olive gray (5Y 4/1); trace iron staining; weathered; consolidated; moist.					
				8.0-10.2'-Sample. Recovered 2.2/2.2'=100%. CLAYSTONE: dark yellowish orange (10YR 6/6); some medium light gray (N 6); sandy with 30-40% iron staining; consolidated; moist.					
	15								
	20			TOTAL DEPTH: 10.2'					

Remarks

Logged by: L. Pivonka

Checked by: 

Project No.

106P06222

Hydro-Search, Inc.

Page 1 of 1

WELL CONSTRUCTION SUMMARY

 LOCATION or COORDS: _____
 N 37395.4 E 23715.3

 ELEVATION: GROUND LEVEL 5881.94'
 TOP OF CASING 5883.78'

DRILLING SUMMARY:

TOTAL DEPTH Well: 6.50' Hole: 10.20'

BOREHOLE DIAMETER 7 1/4"

 DRILLER Boyles Brothers Drilling Co.
 15865 W. 5th Avenue

Golden, CO (Jim Horn)

RIG Mobile B-57

BIT(S) T-5

DRILLING FLUID None

SURFACE CASING 5" x 5' steel w/ locking cap

WELL DESIGN:

BASIS: GEOLOGIC LOG X GEOPHYSICAL LOG _____

CASING STRING(S): C=CASING S=SCREEN

0.00' 3.50' C1 _____

3.50' - 6.49' S1 _____

 CASING: C1 2" I.D. Sch. 5 type 316 stain-
 less steel, threaded and flush
 jointed.

 SCREEN: S1 2" I.D. Sch. 5 type 316 stain-
 less steel, threaded and flush
 jointed, 0.010" wire wrap screen
 0.25' welded bottom cap.

 CENTRALIZERS Type 304 stainless steel
 4.42' - 5.59'

 FILTER MATERIAL 32-42 silica sand
 2.50' - 7.00'

 CEMENT Portland Type I
 0.00' - 2.00'

 OTHER 3/8" bentonite pellets
 2.00' - 2.50'
 7.00' - 10.20'

CONSTRUCTION TIME LOG:

TASK	START		FINISH	
	DATE	TIME	DATE	TIME
DRILLING:	1986		1986	
7 1/4" auger	8/25	1014	8/25	1520
GEOPHYS. LOGGING:	—	—	—	—
CASING:				
2" stainless	8/25	1523	8/25	1525
FILTER PLACEMENT:	8/25	1525	8/25	1530
CEMENTING:	8/25	1533	8/25	1546
DEVELOPMENT:	8/27	1120	9/3	1055
OTHER:				
Bentonite	8/25	1530	8/25	1533
	8/25	1520	8/25	1523

WELL DEVELOPMENT

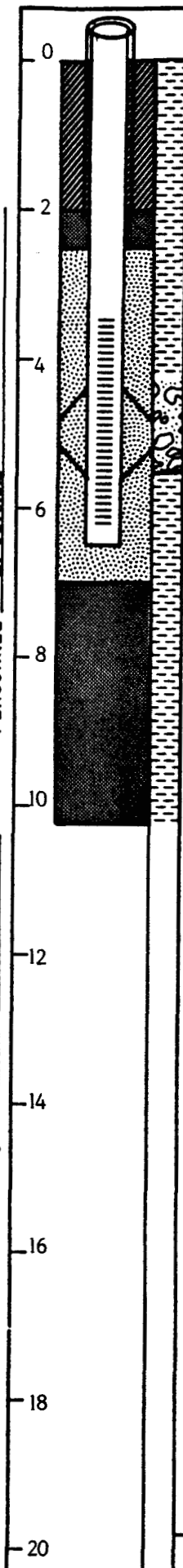
See Well Development Summary Sheet.

COMMENTS:

No water encountered during drilling.

Top of stainless steel casing: 1.84'

 LOCATION Golden, CO
 PERSONNEL L. Pivonka

 PROJECT 106P06222
 Rocky Flats Plant


12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
** Well Number: 3686			
08/27/86	9.28	5883.78	5874.50
09/03/86	-1.00	5883.78	
10/13/86	-1.00	5883.78	
11/26/86	-1.00	5883.78	
01/01/87	7.02	5883.78	5876.76
02/01/87	6.17	5883.78	5877.61
05/06/87	6.08	5883.78	5877.70
06/01/87	5.83	5883.78	5877.95
07/08/87	5.65	5883.78	5878.13
07/27/87	5.80	5883.78	5877.98
08/04/87	7.00	5883.78	5876.78
09/01/87	5.80	5883.78	5877.98
09/28/87	7.60	5883.78	5876.18
11/03/87	7.70	5883.78	5876.08
12/01/87	7.65	5883.78	5876.13

INDEX OF DATA

Boring No.: 39-86

Completed as well? Yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☒ Well Development Summaries
- ☒ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

Project: Rocky Flats Plant

LOG OF BORING NO. 39-86

Date Drilled 9/11/86

Coordinates N 38288.7 E 27591.8

Boring Method Hollow Stem Auger

Ground Surface Elevation 5904.91

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch)		Water Content (%)		Other Tests
					20	40	20	40	
	0			ROCKY FLATS ALLUVIUM					
				0-0.5'-Sample. Recovered 0.2/0.5'=40%. GRAVEL: grayish brown (5YR 3/2); granitic pebbles and cobbles; silty; poorly sorted; unconsolidated; damp.					
				0.5-2.5'-Sample. Recovered 0.0/2.0'=0%.					
	5			2.5-3.0'-Sample. Recovered 0.5/0.5'=100%. GRAVEL: grayish brown (5YR 3/2); granitic pebbles and cobbles; silty; some caliche stringers; poorly sorted; unconsolidated; damp.					
				3.0-5.0'-Sample. Recovered 0.5/2.0'=25%. GRAVEL: dark yellowish orange (10YR 6/6); granitic pebbles and cobbles; clayey; caliche stringers; some iron staining; poorly sorted; unconsolidated; damp.					
	10			5.0-10.0'-Sample. Recovered 1.8/5.0'=36%. GRAVEL: Same as above; damp.					
				10.0-12.5'-Sample. Recovered 1.5/2.5'=60%. CLAY: dark yellowish orange (10YR 6/6); sandy; some granitic cobbles; caliche stringers; poorly sorted; unconsolidated; moist.					
	15			12.5-16.8'-Sample. Recovered 1.5/4.3'=35%. CLAY: Same as above; moist.					
				16.8-22.5'-Sample. Recovered 2.2/4.7'=47%. CLAY: Same as above; moist.					
	20								

Remarks Logged by: L. Pivonka

Checked by: *[Signature]*Project No.
106P06222

Hydro-Search, Inc.

Page 1 of 2

WELL CONSTRUCTION SUMMARY

LOCATION or COORDS: _____
 N 38288.7 E 27591.8

ELEVATION: GROUND LEVEL 5904.91'
 TOP OF CASING 5906.61'

DRILLING SUMMARY:

TOTAL DEPTH Well: 31.50' Hole: 37.00'
 BOREHOLE DIAMETER 7 1/2"
 DRILLER Boyles Brothers Drilling Co.
 15865 W. 5th Avenue
 Golden, CO (Jim Horn)
 RIG Mobile B-57
 BIT(S) Blade bit
 DRILLING FLUID None
 SURFACE CASING 5" x 5' steel w/ locking:
 cap

WELL DESIGN:

BASIS: GEOLOGIC LOG X GEOPHYSICAL LOG _____
 CASING STRING(S): C=CASING S=SCREEN
 0.00' - 5.00' C1 _____
 5.00' - 31.50' S1 _____

 CASING: C1 2" I.D. Sch. 5 type 316 stain-
 less steel, threaded and flush
 jointed.
 SCREEN: S1 2" I.D. Sch. 5 type 316 stain-
 less steel, threaded and flush
 jointed, 0.010" wire wrap screen
 0.25' welded bottom cap.
 CENTRALIZERS Type 304 stainless steel
 18.31' - 19.49'
 FILTER MATERIAL 32-42 silica sand
 4.00' - 31.75'
 CEMENT Portland Type I
 0.00' - 3.00'
 OTHER 3/8" bentonite pellets
 3.00' - 4.00'
 21.75' - 35.80'

CONSTRUCTION TIME LOG:

TASK	START		FINISH	
	DATE 1986	TIME	DATE 1986	TIME
DRILLING: 7 1/2" auger	9/11	1615	9/12	1520
GEOPHYS. LOGGING:	—	—	—	—
CASING: 2" stainless	9/13	0847	9/13	0850
FILTER PLACEMENT:	9/13	0850	9/13	0905
CEMENTING:	9/13	0910	9/13	0925
DEVELOPMENT:	9/16	1314	9/22	1300
OTHER: Bentonite	9/13	0905	9/13	0910
	9/13	0847	9/13	0850

WELL DEVELOPMENT

See Well Development Summary Sheets.

COMMENTS:

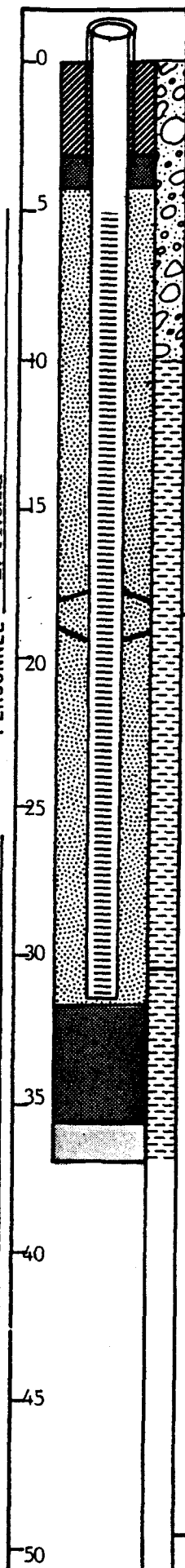
Water encountered at 25.5' during drilling

Top of stainless steel casing: 1.70'

Cave from TD to 35.80'

LOCATION Golden, CO
 PERSONNEL L. Pivonka

PROJECT 106P06222
 Rocky Flats Plant



WELL 39-86

Hydro-Search, Inc. Reno • Denver

AQUIFER TEST DATA

WELL 39-86

Type of Aquifer Test: Constant Discharge Project No.: 106P06222
 How Q Measured: 4.5 gallon bucket Location: Rocky Flats Plant
 How W.L.'s Measured: Olympic Well Sounder Personnel: W. Herst, D. Pavlick
 Measuring Point for W.L.'s: Top of Casing
 Elevation of Measuring Point: 5914.1

Depth of pump/airline:

Pump on: 9/25/86 Time: 1130:00

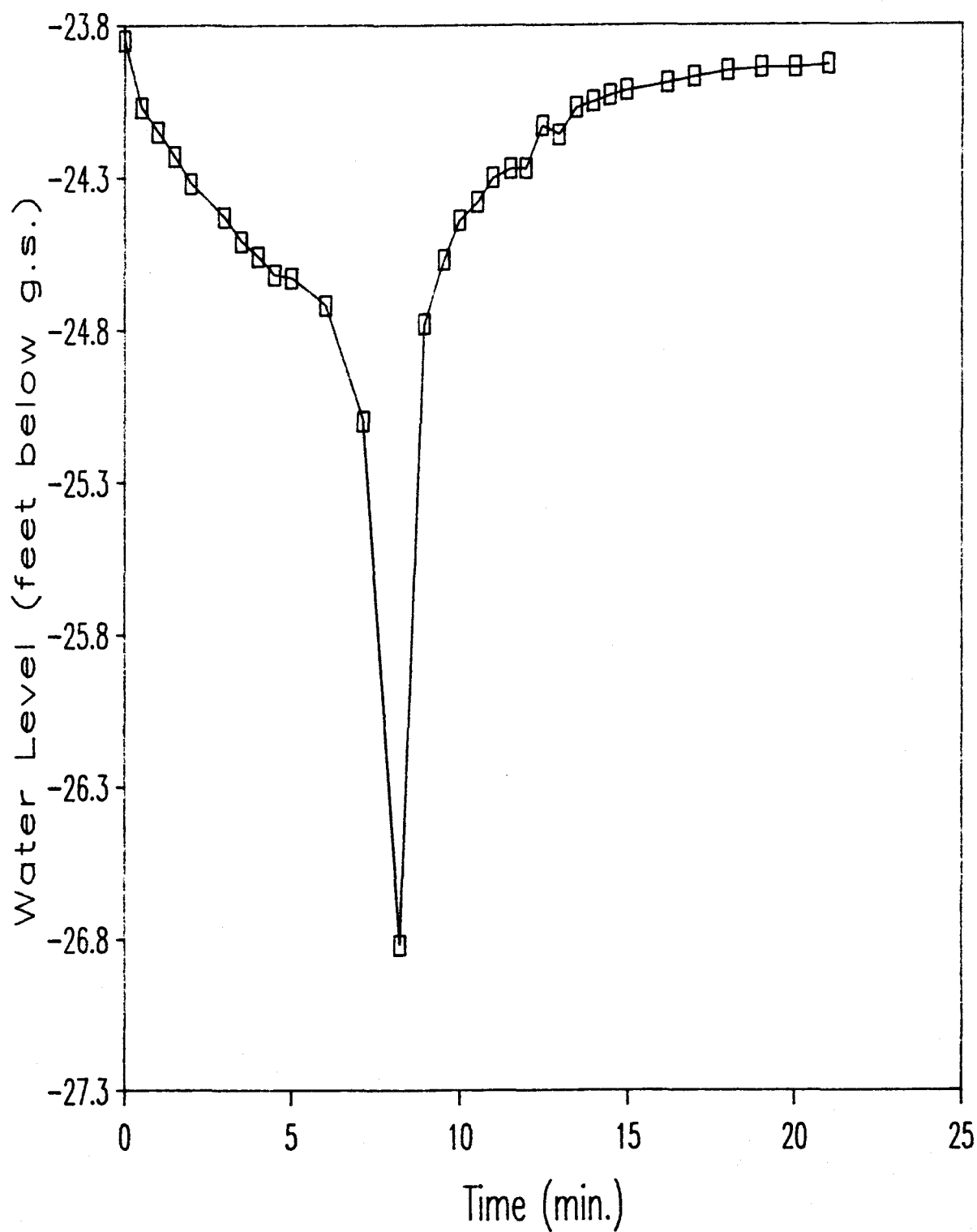
Pump off: 9/25/86 Time: 1138:11

Duration of Aquifer Test: 110 minutes

TIME		WATER LEVEL DATA		COMMENTS
t = 8.2	at t' = 0	Static Water Level: 23.85		
t	t'	Water Level	Draw-down	
0		23.85		Pump on
.5		24.07	.22	
1.0		24.15	.30	Total depth = 30.80'
1.5		24.23	.38	
2.0		24.32	.47	
3.0		24.43	.58	1.41 gpm
3.5		24.51	.66	
4.0		24.56	.71	
4.5		24.62	.77	
5.0		24.63	.78	1.55 gpm
6.0		24.72	.87	
7.1		25.10	1.25	
8.2	0	26.82	2.97	1.45 gpm
8.9	.7	24.78	.93	Pump off at 8.2 minutes
9.5	1.3	24.57	.72	
10.0	1.8	24.44	.59	
10.5	2.3	24.38	.53	
11.0	2.8	24.30	.45	
11.5	3.3	24.27	.42	
12.0	3.8	24.27	.42	
12.5	4.3	24.13	.28	
13.0	4.8	24.16	.31	
13.5	5.3	24.07	.22	90% recharged at
14.0	5.8	24.05	.20	24.15'
14.5	6.3	24.03	.18	
15.0	6.8	24.01	.16	
16.2	8.0	23.99	.14	
17.0	8.8	23.97	.12	
18.0	9.8	23.95	.10	
19.0	10.8	23.94	.09	
20.0	11.8	23.94	.09	
21.0	12.8	23.93	.08	

AQUIFER TEST DATA

WELL 39-86



12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
** Well Number: 3986			
09/16/86	25.17	5906.61	5881.44
09/17/86	25.38	5906.61	5881.23
09/18/86	25.38	5906.61	5881.23
09/19/86	25.40	5906.61	5881.21
09/24/86	25.38	5906.61	5881.23
10/13/86	25.57	5906.61	5881.04
11/26/86	25.82	5906.61	5880.79
01/01/87	5.92	5906.61	5900.69
02/01/87	25.63	5906.61	5880.98
04/01/87	25.79	5906.61	5880.82
05/06/87	24.67	5906.61	5881.94
06/01/87	24.75	5906.61	5881.86
07/07/87	24.75	5906.61	5881.86
08/04/87	24.90	5906.61	5881.71
09/01/87	25.20	5906.61	5881.41
09/03/87	25.50	5906.61	5881.11
09/03/87	25.20	5906.61	5881.41
09/28/87	24.40	5906.61	5882.21
11/03/87	25.50	5906.61	5881.11
12/01/87	25.55	5906.61	5881.06

INDEX OF DATA

Boring No.: 40-86

Completed as well? Yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☒ Well Development Summaries
- ☐ Hydraulic Conductivity Test Data
and Results
- ☒ Packer Test Data and Results
- ☒ Water Level Data

LOG OF BORING NO. 40-86

Date Drilled 9/23/86

Coordinates N 36612.8 E 25398.1

Boring Method Casing Driver/NC Core

Ground Surface Elevation 5941.23

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch)		Water Content (%)		Other Tests
					20	40	20	40	
	0			ROCKY FLATS ALLUVIUM					
				0-2.0'-Cuttings. GRAVEL: ~50% quartzite cobbles and ~50% silty sand; poorly sorted; unconsolidated; dry.					
				2.0-4.0'-Cuttings. BOULDER: large quartzite boulder; dry.					
	5'			4.0-19.0'-Cuttings. GRAVEL: moderate brown (5YR 4/4); ~60% granitic pebbles and cobbles and 40% silty sand; poorly sorted; unconsolidated; damp.					
	10								
	15								
	20			19.0-23.0'-Cuttings. BOULDERS: quartzite boulders and cobbles; poorly sorted; unconsolidated; dry.					

Remarks

Logged by: T. Gulliver & L. Pivonka

Checked by:

Project No.
106P06222

Hydro-Search, Inc.

Page 1 of 7

Project:		Rocky Flats Plant		LOG OF BORING NO.		40-86	
Date Drilled		9/23/86		Coordinates N36612.8 E 25398.1			
Boring Method		Casing Driver/NC Core		Ground Surface Elevation		5941.23	
Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch) 20 40	Water Content (%) 20 40	Other Tests
	20			<p>23.0-28.0'-Cuttings. GRAVEL: moderate brown (5YR 4/4); granitic pebbles and sand; silty; poorly sorted; unconsolidated; damp.</p> <p>28.0-30.0'-Cuttings. GRAVEL: moderate brown (5YR 4/4); ~20% granitic pebbles and cobbles; silty; poorly sorted; unconsolidated; damp.</p> <p>30.0-31.0'-Cuttings. BOULDER: large granite boulder.</p> <p>31.0-38.0'-Cuttings. GRAVEL: moderate brown (5YR 4/4); ~30-40% granitic cobbles; sandy; silty; poorly sorted; unconsolidated; damp.</p>			
	35			38.0-41.0'-Cuttings. SAND: moderate brown (5YR 4/4); coarse to very fine-grained; poorly sorted; unconsolidated; damp.			
	40						

Remarks Logged by: T. Gulliver & L. Pivonka Checked by: *[Signature]*

Project No.
106P06222
Hydro-Search, Inc.
Page 2 of 7

Project: Rocky Flats Plant


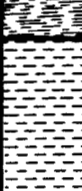
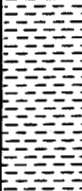

LOG OF BORING NO. 40-86

Date Drilled 9/23/86

Coordinates N 36612.8 E 25398.1

Boring Method Casing Driver/NC Core

Ground Surface Elevation 5941.23

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	40			41.0-42.0'-Cuttings. GRAVEL: moderate brown (5YR 4/4); 30% quartzite cobbles; sandy; silty; poorly sorted; unconsolidated; damp. 42.0-44.0'-Cuttings. BOULDERS: granitic cobbles and boulders; poorly sorted; subangular to subrounded; damp.					
	45			44.0-45.0'-Cuttings. SILT: moderate brown (5YR 4/4); 85-90% silt; trace granitic pebbles (subangular to subrounded); poorly sorted; damp.					
				ARAPAHOE FORMATION					
	50			45.0-50.0'-Cuttings. CLAYSTONE: dark yellowish brown (10YR 4/2); light olive gray (5Y 4/4) streaks; consolidated; damp.					
				50.0-51.0'-Cuttings. SILTSTONE: medium gray (N 5); clayey; well sorted; non-calcareous; dry.					
	55			51.0-53.0'-Cuttings. CLAYSTONE: dusky yellowish brown (10YR 2/2); silty; consolidated; damp.					
				58.3-61.2'-Sample. Recovered 2.0/2.9'=69%. CLAYSTONE: dark gray (N 4); silty; unweathered; trace iron staining; consolidated; moist.					
	60								

Remarks

Logged by: T. Gulliver & L. Pivonka

Checked by: 

Project No.

106P06222

Hydro-Search, Inc.

Page 3 of 7

Project: Rocky Flats Plant

LOG OF BORING NO. 40-86

Date Drilled 9/23/86

Coordinates N 36612.8 E 25398.1

Boring Method Casing Driver/NC Core

Ground Surface Elevation 5941.23

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
60				61.2-66.2'-Sample. Recovered 4.3/5.0'=86%. CLAYSTONE: dark gray (N 3); trace of grayish orange (10YR 7/4) mottling; trace of coal; blocky texture; consolidated; moist.					
65				66.2-69.2'-Sample. Recovered 2.4/3.0'=80%. CLAYSTONE: Same as above; moist.					
70				69.2-71.2'-Sample. Recovered 1.8/2.0'=90%. CLAYSTONE: Same as above; moist.					
75				71.2-73.7'-Sample. Recovered 2.5/2.5'=100%. CLAYSTONE: Same as above; moist.					
				73.7-76.2'-Sample. Recovered 2.5/2.5'=100%. CLAYSTONE: Same as above; moist.					
				76.2-81.2'-Sample. Recovered 5.0/5.0'=100%. SANDSTONE: medium gray (N 5); clayey; fine-grained; well sorted; moist.					
80									

Remarks

Logged by: T. Gulliver & L. Pivonka

Checked by: *[Signature]*

Project No.

106P06222

Hydro-Search, Inc.

Page 4 of 7

Project: Rocky Flats Plant

LOG OF BORING NO. 40-86

Date Drilled 9/23/86

Coordinates N 36612.8 E 25398.1

Boring Method Casing Driver/NC Core

Ground Surface Elevation 5941.23

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	80			81.2-83.7'-Sample. Recovered 2.5/2.5'=100%. SANDSTONE: Same as above; moist.					
				83.7-86.2'-Sample. Recovered 2.5/2.5'=100%. CLAYSTONE: dark gray (N 3); silty; some organic carbon plant fossils; moist.					
	85			86.2-88.0'-Sample. Recovered 1.8/1.8'=100%. CLAYSTONE: dark gray (N 3); silty; some organic carbon plant fossils; moist.					
				88.0-90.9'-Sample. Recovered 2.9/2.9'=100%. CLAYSTONE/SANDSTONE: dark gray (N 3) claystone and interbedded with 0.2 to 1.0" layers of fine-- grained sandstone; moist.					
	90			90.9-95.9'-Sample. Recovered 5.0/5.0'=100%. SANDSTONE: dark gray (N 3); fine-grained; some organic-rich interlaminae; trace of calcium carbonate; well sorted; moist to wet.					
				95.9-100.9'-Sample. Recovered 5.0/5.0'=100%. SANDSTONE: dark gray (N 3); fine-grained; some organic-rich interlaminae; well sorted; moist to wet.					
	95								
	100								

Remarks

Logged by: T. Gulliver & L. Pivonka

Checked by: 

Project No.

106P06222

Hydro-Search, Inc.

Page 5 of 7

Project: Rocky Flats Plant

LOG OF BORING NO. 40-86

Date Drilled 9/23/86

Coordinates N 36612.8 E 25398.1

Boring Method Casing Driver/NC Core

Ground Surface Elevation 5941.23

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch) 20 40	Water Content (%) 20 40	Other Tests
	100						
				104.4-105.9'-Sample. Recovered 1.5/1.5'=100%. SANDSTONE: dark gray (N 3); fine-grained; interbedded organic-rich claystone; moist.			
	105			105.9-110.9'-Sample. Recovered 5.0/5.0'=100%. SANDSTONE: medium gray (N 5) to medium dark gray (N 4); silty; interbedded thin coal seams; fine- grained, well sorted; moist to wet.			
				110.9-112.9'-Sample. Recovered 2.0/2.0'=100%. CLAYSTONE: medium dark gray (N 4); silty; some grayish orange (10YR 7/4) ironstone concretions; moist.			
	110			112.9-115.9'-Sample. Recovered 3.0/3.0'=100%. SANDSTONE: medium dark gray (N 4); silty; some carbonaceous plant fossils; well sorted; moist.			
				115.9-120.4'-Sample. Recovered 4.5/4.5'=100%. SANDSTONE: Same as above;moist.			
	115						
	120						

Remarks

Logged by: T. Gulliver & L. Pivonka

Checked by: *[Signature]*

Project No.

106P06222

Hydro-Search, Inc.

Page 6 of 7

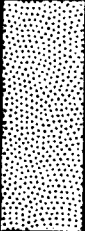
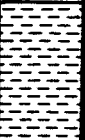
LOG OF BORING NO. 40-86

Date Drilled 9/23/86

Coordinates N 36612.8 E 25398.1

Boring Method Casing Driver/NC Core

Ground Surface Elevation 5941.23

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	120			120.4-123.2'-Sample. Recovered 2.8/2.8'=100%. SANDSTONE: medium gray (N 5); fine to medium-grained; some thin coal seams; well sorted; wet.					
				123.2-124.8'-Sample. Recovered 1.5/1.5'=100%. CLAYSTONE: medium gray (N 5); silty; laminated; moist.					
	125			TOTAL DEPTH: 125.0'					
	130								
	135								
	140								

Remarks

Logged by: T. Gulliver & L. Pivonka

Checked by:

Project No.

106P06222

Hydro-Search, Inc.

Page 7 of 7

WELL CONSTRUCTION SUMMARY

 LOCATION or COORDS: _____
 N 36612.8 E 25398.1

 ELEVATION: GROUND LEVEL 5941.23'
 TOP OF CASING 5942.21'

DRILLING SUMMARY:

 TOTAL DEPTH Well: 111.50' Hole: 125.00'
 BOREHOLE DIAMETER 0.00' - 52.00': 5 5/8"
 52.00' - 125.00': 4 3/4"
 DRILLER Boyles Brothers Drilling Co.
 15865 W. 5th Avenue
 Golden, CO (Jim Horn, "Tom High")
 RIG 0.00' - 52.00': casing advancer, 52.00' -
 125.00': Mobile B-57
 BIT(S) 0.00' - 52.00': down hole hammer, 52.0'
 - 125.00': coring bit
 DRILLING FLUID None
 SURFACE CASING 5" x 55.36' steel w/ lock-
 ing cap

WELL DESIGN:

 BASIS: GEOLOGIC LOG ☒ GEOPHYSICAL LOG ☒
 CASING STRING(S): C=CASING S=SCREEN

0.00'	51.96'	C1	-	-	-
0.00'	87.98'	C2	-	-	-
87.98'	111.50'	S1	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

 CASING: C1 5" I.D. steel surface casing.
 C2 2" I.D. Sch. 5 type 316 stain-
 less steel, threaded and flush
 jointed.
 SCREEN: S1 2" I.D. Sch. 5 type 316 stain-
 less steel, threaded and flush
 jointed, 0.010" wire wrap screen,
 0.25" welded bottom cap.
 CENTRALIZERS Type 304 stainless steel
 100.25' - 101.47'
 FILTER MATERIAL 32-42 silica sand
 87.00' - 111.70'
 CEMENT Portland Type I
 0.00' - 85.00'
 OTHER 3/8" bentonite pellets
 85.00' - 87.00'
 111.70' - 125.00'

CONSTRUCTION TIME LOG:

TASK	START		FINISH	
	DATE	TIME	DATE	TIME
DRILLING:	1986		1986	
5 5/8" casing	9/23	0950	9/23	1335
NC core	10/3	1527	10/7	1530
Reaming	10/4	1530	10/8	0935
GEOPHYS. LOGGING:	-	-	-	-
CASING:				
2" stainless	10/8	1410	10/8	1413
5" steel	9/23	0950	9/23	1335
FILTER PLACEMENT:	10/8	1413	10/8	1545
CEMENTING:	10/8	1554	10/8	1623
LEVELPMENT:	10/23	1310	10/23	1310
OTHER:				
Bentonite	10/8	1545	10/8	1554
	10/8	1300	10/8	1346
Packer testing	10/7	0800	10/7	1515

WELL DEVELOPMENT

See Well Development Summary Sheet.

COMMENTS:

Water encountered at 91.0' during drilling.

Top of stainless steel casing: 0.98'

WELL 40-86

Hydro-Search, Inc. Reno • Denver

PACKER TEST ANALYSIS
 WELL NO. 40-86
 ROCKY FLATS PLANT JOB NO. 106P06222
 DATE TESTED: 10/7/86 BY: L. PIVONKA
 TEST INTERVAL (FEET BELOW G.S.): 63.00 - 73.03
 MATERIAL TESTED: ARAPAHOE CLAYSTONE
 DEPTH TO WATER (FEET BELOW G.S.): 91.00

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00031139 (FEET³/MIN)
 L = LENGTH OF TEST INTERVAL = 10.03 FEET
 TEST INTERVAL IS ABOVE WATER TABLE
 HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
 + GAGE PRESSURE (IN FEET)
 = 68.01 + 4.90 + 4.00 * 2.31 = 82.15
 R = BOREHOLE RADIUS = .16 FEET

 K = HYDRAULIC CONDUCTIVITY = .00000025 FT/MIN
 K = .00000013 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00177354 (FEET³/MIN)
 L = LENGTH OF TEST INTERVAL = 10.03 FEET
 TEST INTERVAL IS ABOVE WATER TABLE
 HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
 + GAGE PRESSURE (IN FEET)
 = 68.01 + 4.90 + 13.00 * 2.31 = 102.94
 R = BOREHOLE RADIUS = .16 FEET

 K = HYDRAULIC CONDUCTIVITY = .00000113 FT/MIN
 K = .00000057 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00047385 (FEET³/MIN)
 L = LENGTH OF TEST INTERVAL = 10.03 FEET
 TEST INTERVAL IS ABOVE WATER TABLE
 HEAD = DEPTH OF CENTER OF INTERVAL + GAGE HEIGHT
 + GAGE PRESSURE (IN FEET)
 = 68.01 + 4.90 + 4.00 * 2.31 = 82.15
 R = BOREHOLE RADIUS = .16 FEET

 K = HYDRAULIC CONDUCTIVITY = .00000038 FT/MIN
 K = .00000019 CM/SEC

PACKER TEST ANALYSIS

WELL NO. 40-86

ROCKY FLATS PLANT JOB NO. 106P06222

DATE TESTED: 10/7/86 BY: L. PIVONKA

TEST INTERVAL (FEET BELOW G.S.): 92.00 - 102.03

MATERIAL TESTED: ARAFAHOE SANDSTONE

DEPTH TO WATER (FEET BELOW G.S.): 91.00

$$K = \frac{Q}{2(P_1)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00036554 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 10.03 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 91.00 + 4.90 + 4.00 * 2.31 = 105.14

R = BOREHOLE RADIUS = .16 FEET

K = HYDRAULIC CONDUCTIVITY = .00000023 FT/MIN

K = .00000012 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00121847 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 10.03 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 91.00 + 4.90 + 21.00 * 2.31 = 144.41

R = BOREHOLE RADIUS = .16 FEET

K = HYDRAULIC CONDUCTIVITY = .00000055 FT/MIN

K = .00000028 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00016246 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 10.03 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 91.00 + 4.90 + 4.00 * 2.31 = 105.14

R = BOREHOLE RADIUS = .16 FEET

K = HYDRAULIC CONDUCTIVITY = .00000010 FT/MIN

K = .00000005 CM/SEC

PACKER TEST ANALYSIS
 WELL NO. 40-86
 ROCKY FLATS PLANT JOB NO. 106P06222
 DATE TESTED: 10/7/86 BY: L. PIVONKA
 TEST INTERVAL (FEET BELOW G.S.): 102.00 - 112.03
 MATERIAL TESTED: ARAPAHOE SANDSTONE
 DEPTH TO WATER (FEET BELOW G.S.): 91.00

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00028431 (FEET³/MIN)
 L = LENGTH OF TEST INTERVAL = 10.03 FEET
 TEST INTERVAL IS BELOW WATER TABLE
 HEAD = DEPTH TO WATER + GAGE HEIGHT
 + GAGE PRESSURE (IN FEET)
 = 91.00 + 4.90 + 4.00 * 2.31 = 105.14
 R = BOREHOLE RADIUS = .16 FEET

 K = HYDRAULIC CONDUCTIVITY = .00000018 FT/MIN
 K = .00000009 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00116431 (FEET³/MIN)
 L = LENGTH OF TEST INTERVAL = 10.03 FEET
 TEST INTERVAL IS BELOW WATER TABLE
 HEAD = DEPTH TO WATER + GAGE HEIGHT
 + GAGE PRESSURE (IN FEET)
 = 91.00 + 4.90 + 17.00 * 2.31 = 135.17
 R = BOREHOLE RADIUS = .16 FEET

 K = HYDRAULIC CONDUCTIVITY = .00000056 FT/MIN
 K = .00000029 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00040616 (FEET³/MIN)
 L = LENGTH OF TEST INTERVAL = 10.03 FEET
 TEST INTERVAL IS BELOW WATER TABLE
 HEAD = DEPTH TO WATER + GAGE HEIGHT
 + GAGE PRESSURE (IN FEET)
 = 91.00 + 4.90 + 4.00 * 2.31 = 105.14
 R = BOREHOLE RADIUS = .16 FEET

 K = HYDRAULIC CONDUCTIVITY = .00000025 FT/MIN
 K = .00000013 CM/SEC

PACKER TEST ANALYSIS

WELL NO. 40-86

ROCKY FLATS PLANT JOB NO. 106P06222

DATE TESTED: 10/7/86 BY: L. PIVONKA

TEST INTERVAL (FEET BELOW G.S.): 113.00 - 123.03

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 91.00

$$K = \frac{Q}{2(PI)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00124554 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 10.03 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 91.00 + 4.90 + 3.50 * 2.31 = 103.99

R = BOREHOLE RADIUS = .16 FEET

K = HYDRAULIC CONDUCTIVITY = .00000078 FT/MIN

K = .00000040 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .01506158 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 10.03 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 91.00 + 4.90 + 25.00 * 2.31 = 153.65

R = BOREHOLE RADIUS = .16 FEET

K = HYDRAULIC CONDUCTIVITY = .000000642 FT/MIN

K = .000000326 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00120493 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 10.03 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 91.00 + 4.90 + 4.00 * 2.31 = 105.14

R = BOREHOLE RADIUS = .16 FEET

K = HYDRAULIC CONDUCTIVITY = .00000075 FT/MIN

K = .000000038 CM/SEC

12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
--------------------------	------------------------------------	-------------------------------	-----------------------------------

** Well Number: 4086

10/23/86	-1.00	5942.21	
11/26/86	105.75	5942.21	5836.46
01/01/87	95.23	5942.21	5846.98
02/01/87	92.13	5942.21	5850.08
05/06/87	85.63	5942.21	5856.58
06/01/87	102.60	5942.21	5839.61
07/07/87	103.45	5942.21	5838.76
07/20/87	101.10	5942.21	5841.11
08/06/87	104.30	5942.21	5837.91
09/01/87	100.30	5942.21	5841.91
10/22/87	93.80	5942.21	5848.41
11/02/87	108.40	5942.21	5833.81
12/01/87	103.30	5942.21	5838.91

INDEX OF DATA

Boring No.: 41-86

Completed as well? Yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☒ Well Development Summaries
- ☒ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

Project: Rocky Flats Plant

LOG OF BORING NO. 41-86

Date Drilled 8/16/86 - 8/18/86

Coordinates N 36611.4 E 25437.1

Boring Method Hollow Stem Auger

Ground Surface Elevation 5940.03

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	0			ROCKY FLATS ALLUVIUM					
				0-2.0'-Sample. Recovered 1.8/2.0'=90%.					
				0-0.3'. GRAVEL: moderate brown (5YR 3/4); granitic pebbles and cobbles; sandy; caliche stringers; poorly sorted; subangular; unconsolidated; dry.					
	2.5			0.3-1.5'. CLAY: moderate reddish brown (10R 4/6); trace granitic pebbles and cobbles; silty; poorly sorted; unconsolidated; damp.					
				2.0-4.0'-Sample. Recovered 2.0/2.0'=100%. CLAY: moderate reddish brown (10R 4/6); trace granitic pebbles and cobbles; caliche stringers; poorly sorted; unconsolidated; damp.					
	5			4.0-6.0'-Sample. Recovered 2.0/2.0'=100%. SAND: moderate reddish brown (10R 4/6); clayey; very fine-grained; trace quartzite cobbles; poorly sorted; subangular to subrounded; unconsolidated; wet.					
	7.5			6.0-8.0'-Sample. Recovered 1.8/2.0'=90%. GRAVEL: dark yellowish orange (10YR 6/6); quartzite pebbles and cobbles; poorly sorted; subangular; unconsolidated; damp.					
	10			8.0-10.0'-Sample. Recovered 1.6/2.0'=80%. GRAVEL: moderate yellowish brown (10R 4/6); 20% cobbles > 1/2" in diameter; sandy and clayey matrix; iron staining; poorly sorted; unconsolidated; damp.					

Remarks Logged by: C. Walker

Checked by: *[Signature]*

Project No.
106P06222

Hydro-Search, Inc.

Page 1 of 5

Project: Rocky Flats Plant

LOG OF BORING NO. 41-86

Date Drilled 8/16/86 - 8/18/86

Coordinates N 36611.4 E 25437.1

Boring Method Hollow Stem Auger

Ground Surface Elevation 5940.03

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	10			10.0-12.0'-Sample. Recovered 1.9/2.0'=90%. GRAVEL: dark yellowish orange (10YR 6/6); granite and quartzite pebbles; caliche stringers; iron staining; poorly sorted; unconsolidated; damp.					
	12.5			12.0-14.0'-Sample. Recovered 1.4/2.0'=70%. CLAY: moderate reddish brown (10R 4/6); trace quartzite pebbles; sandy; caliche stringers; poorly sorted; unconsolidated; damp.					
	15			14.0-16.0'-Sample. Recovered 1.8/2.0'=90%. SAND: moderate reddish brown (10R 4/6); granitic; fine- to coarse-grained; poorly sorted; angular; unconsolidated; damp.					
	17.5			16.0-18.0'-Sample. Recovered 2.0/2.0'=100%. SAND: moderate reddish brown (10R 4/6); fine to coarse grained; some granitic pebbles and cobbles; poorly sorted; angular; unconsolidated; damp.					
	20			18.0-20.0'-Sample. Recovered 2.0/2.0'=100%. GRAVEL: moderate reddish brown (10R 4/6); 50-70% granite and quartzite pebbles; clay and sand matrix; poorly sorted; unconsolidated; damp.					

Remarks Logged by: C. Walker

Checked by: *[Signature]*

Project No.

106P06222

Hydro-Search, Inc.

Page 2 of 5

Project: Rocky Flats Plant

LOG OF BORING NO. 41-86

Date Drilled 8/16/86 - 8/18/86

Coordinates N 36611.4 E 25437.1

Boring Method Hollow Stem Auger

Ground Surface Elevation 5940.03

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch)		Water Content (%)		Other Tests
					20	40	20	40	
	20			20.0-22.0'-Sample. Recovered 2.0/2.0'=100%. GRAVEL: moderate reddish brown (10R 4/6); 50-70% granite and quartzite pebbles; clay and sand matrix; iron staining; caliche stringers; poorly sorted, unconsolidated; damp.					
	22.5			22.0-24.0'-Sample. Recovered 2.0/2.0'=100%. GRAVEL: moderate reddish brown (10R 4/6); clay and sand matrix; 50-70% pebbles; some schists and quartzite; sandstone; unsorted; damp.					
	25			24.0-26.0'-Sample. Recovered 2.0/2.0'=100%. GRAVEL: moderate reddish brown (10R 4/6); clay and sand matrix; 50-70% pebbles; some schists and quartzite; sandstone; unsorted; sandy lenses at 24.3-24.5' 2" thick; damp.					
	27.5			26.0-28.0'-Sample. Recovered 1.9/2.0'=95%. GRAVEL: light brown (5YR 5/6); some quartzite cobbles; dark yellowish orange (10YR 6/6) limonite; poorly sorted; angular; unconsolidated; damp.					
				28.0-28.5'-Sample. Recovered 0.0/0.5'=0%.					
				28.5-30.0'-Sample. Recovered 1.5/1.5'=100%. GRAVEL: moderate yellowish brown (10YR 5/4); quartzite pebbles and cobbles; sandy clay matrix; poorly sorted; unconsolidated; damp.					
	30								

Remarks Logged by: C. Walker

Checked by: 

Project No.

106P06222

Hydro-Search, Inc.

Page 3 of 5

Project: Rocky Flats Plant

LOG OF BORING NO. 41-86

Date Drilled 8/16/86 - 8/18/86

Coordinates N 36611.4 E 25437.1

Boring Method Hollow Stem Auger

Ground Surface Elevation 5940.03

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch)		Water Content (%)		Other Tests
					20	40	20	40	
	30			30.0-31.5'-Sample. Recovered 0.8/1.5'=53%. GRAVEL: Same as above; damp.					
				31.5-31.8'-Sample. Recovered 0.0/0.3'=0%.					
				31.8-32.2'-Sample. Recovered 0.0/0.4'=0%.					
				32.2-32.5'-Sample. Recovered 0.3/0.3'=100%.					
				SAND: moderate brown (5YR 4/4); quartzose sand; fine-grained; gravelly; poorly sorted; subangular to subrounded; unconsolidated; damp.					
	32.5			32.5-33.3'-Sample. Recovered 0.9/0.8'=113%.					
				GRAVEL: pale orange yellow (10YR 5/6) to light brown (5YR 5/6); 30% granite pebbles and cobbles with very coarse to fine-grained sand; poorly sorted; unconsolidated; damp.					
				33.3-35.0'-Sample. Recovered 2.0/1.7'=118%.					
	35			GRAVEL: Same as above; damp.					
				35.0-37.0'-Sample. Recovered 1.7/2.0'=85%.					
				SAND: moderate brown (5YR 4/4); clay matrix; some quartzite cobbles (<20%); iron staining in sands at 37.0'; becomes more cobbley with depth; poorly sorted; unconsolidated; damp.					
				37.0-38.5'-Sample. Recovered 1.5/1.5'=100%.					
	37.5			SAND: Same as above; damp.					
				38.5-40.0'-Sample. Recovered 1.5/1.5'=100%.					
				38.5-39.6'. GRAVEL: moderate brown (5YR 4/4); granitic pebbles and cobbles and clayey sand; poorly sorted; angular; unconsolidated; wet.					
				39.6-40.0'. SAND: yellowish gray (5Y 7/2) to light olive gray (5Y 5/2); fine-grained; clayey; trace coarse-grained sand; moderately sorted; unconsolidated; damp.					
	40								

Remarks Logged by: C. Walker

Checked by: *[Signature]*

Project No.
106P06222

Hydro-Search, Inc.

Page 4 of 5

Project: Rocky Flats Plant

LOG OF BORING NO. 41-86

Date Drilled 8/16/86 - 8/18/86

Coordinates N 36611.4 E 25437.1

Boring Method Hollow Stem Auger

Ground Surface Elevation 5940.03

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	40			40.0-41.2'-Sample. Recovered 1.2/1.2'=100%. SAND: Same as above; wet.					
				41.2-41.7'-Sample. Recovered 0.0/0.5'=0%.					
				41.7-43.0'-Sample. Recovered 1.2/1.3'=92%. GRAVEL: moderate yellowish brown (10YR 5/4); granite and quartzite pebbles; clayey sand matrix; dark yellowish orange (10YR 6/6) iron staining; poorly sorted; unconsolidated; wet.					
	42.5			43.0-44.8'-Sample. Recovered 1.4/1.5'=93%.					
				43.0-44.0'. GRAVEL: light brown (5YR 5/6) to moderate brown (5YR 4/4); granitic pebbles and cobbles; sandy clay matrix; poorly sorted; subangular; unconsolidated; wet.					
	45			44.0-44.4'. SAND: moderate reddish orange (10R 6/6); quartz and feldspar sand; fine to coarse-grained; trace granitic pebbles and cobbles; poorly sorted; unconsolidated; wet.					
				ARAPAHOE FORMATION					
				44.0-44.8'. CLAYSTONE: yellowish gray (5Y 7/2); silty; black organic flakes; poorly consolidated; wet.					
	47.5			TOTAL DEPTH: 44.8'					
	50								

Remarks Logged by: C. Walker

Checked by: *[Signature]*

Project No.
106P06222

Hydro-Search, Inc.

Page 5 of 5

WELL CONSTRUCTION SUMMARY

LOCATION or COORDS: N 36611.4 E 25437.1

ELEVATION: GROUND LEVEL 5940.03'
TOP OF CASING 5941.83'

DRILLING SUMMARY:

TOTAL DEPTH Well: 44.70' Hole: 45.06'
BOREHOLE DIAMETER 7½"

DRILLER Boyles Brothers Drilling Co.
15865 W. 5th Avenue
Golden, CO (Tony Robinson)

RIG Acker
BIT(S) Blade bit

DRILLING FLUID None

SURFACE CASING 5" x 4' steel w/ locking cap

WELL DESIGN:

BASIS: GEOLOGIC LOG X GEOPHYSICAL LOG

CASING STRING(S): C= CASING S=SCREEN

[illegible]

CASING: C1 2" I.D. Sch. 5 type 316 stain-
less steel, threaded and flush
jointed.

SCREEN: SI 2" I.D. Sch. 5 type 316 stain-
less steel, threaded and flush
jointed, 0.010" wire wrap screen
0.25' welded bottom cap.

CENTRALIZERS None (see comments)

FILTER MATERIAL 32-42 silica sand
2.79' - 44.70'

CEMENT Portland Type I
0.00' - 2.00'

OTHER 3/8" bentonite pellets
2.00' - 2.79'

CONSTRUCTION TIME LOG:

<u>TASK</u>	<u>START</u>		<u>FINISH</u>	
	<u>DATE</u> 1986	<u>TIME</u>	<u>DATE</u> 1986	<u>TIME</u>
DRILLING:				
<u>7 1/2" auger</u>	<u>8/16</u>	<u>1701</u>	<u>8/18</u>	<u>1745</u>
<u>7 1/2" casing ad-</u>	<u>8/19</u>	<u>1045</u>	<u>8/19</u>	<u>1207</u>
<u>vancer</u>				
GEOPHYS. LOGGING:	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>
CASING:				
<u>2" stainless</u>	<u>8/19</u>	<u>1410</u>	<u>8/19</u>	<u>1420</u>
FILTER PLACEMENT:	<u>8/19</u>	<u>1420</u>	<u>8/19</u>	<u>1815</u>
CEMENTING:	<u>8/19</u>	<u>1820</u>	<u>8/19</u>	<u>1825</u>
DEVELOPMENT:	<u>9/23</u>	<u>1320</u>	<u>9/25</u>	<u>1650</u>
OTHER:				
<u>Bentonite</u>	<u>8/19</u>	<u>1815</u>	<u>8/19</u>	<u>1820</u>

WELL DEVELOPMENT

See Well Development Summary Sheet.

COMMENTS:

Water encountered at 36.7' during drilling

Top of stainless steel casing: 1.80'

Cave from TD to 44.70'.

Well built through casing advancer; no centralizers used.

HYDRO-SEARCH RENO • DENVER

CONSULTING HYDROLOGISTS-GEOLOGIST

WELL 41-86

Hydro-Search, Inc. Reno • Denver

AQUIFER TEST DATA WELL 41-86

Type of Aquifer Test: Bail down - Recovery Project No.: 106P06222
 How Q Measured: 4.5 gallon bucket Location: Rocky Flats Plant
 How W.L.'s Measured: Olympic Well Sounder Personnel: J. Pearce, M. Bergman
 Measuring Point for W.L.'s: Top of Casing
 Elevation of Measuring Point: 5943.12'

Depth of pump/airline: N/A
 Start bailing: Time: 930.00
 Stop bailing: Time: 945.16
 Duration of Aquifer Test: 4362.2 min.

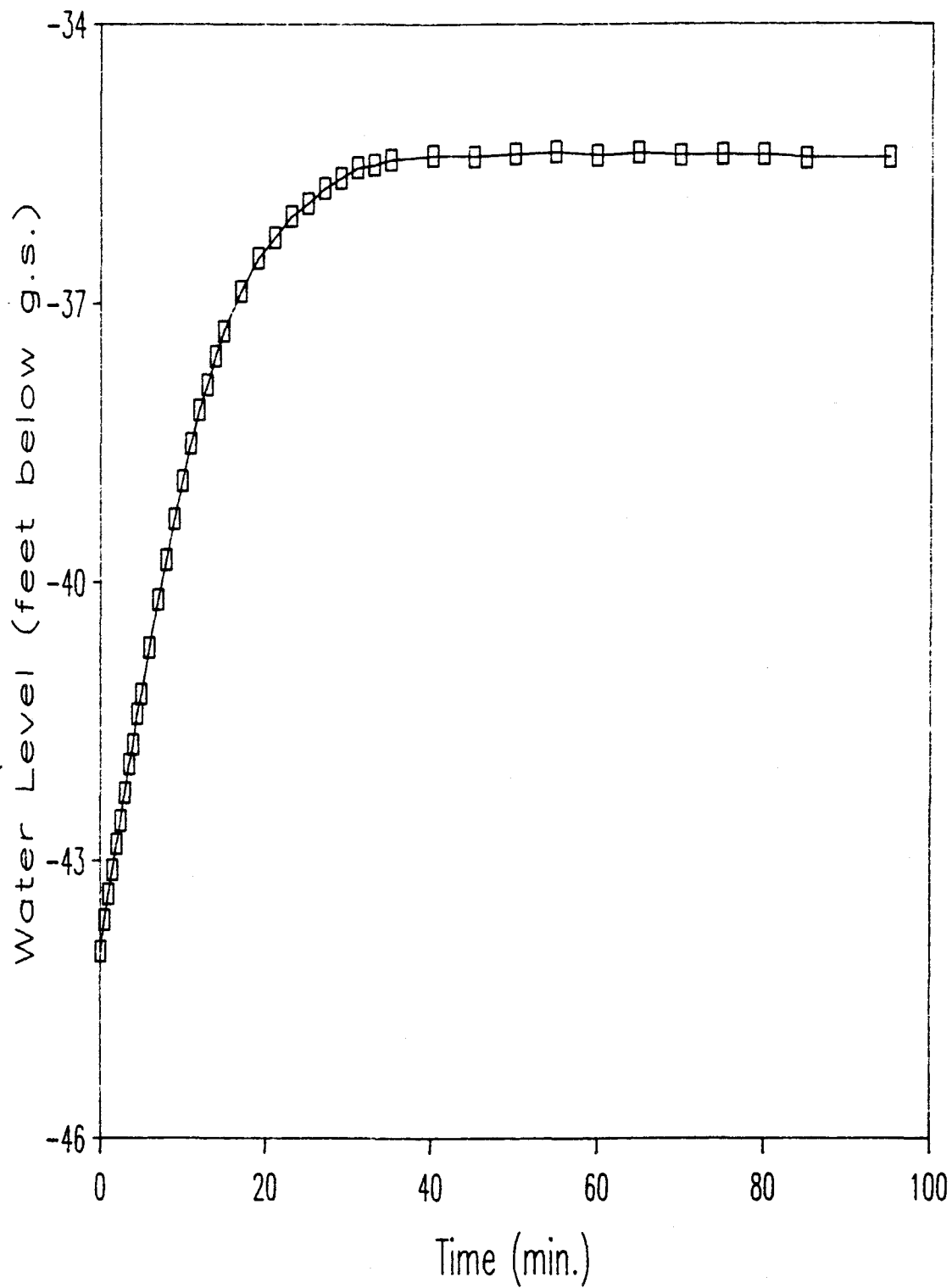
TIME		WATER LEVEL DATA		COMMENTS
t = 15.16 min.	at t' = 0	Static Water Level: 24.91'		
t	t'	Water Level	Draw-down	
0				Begin bailing
15.2	0	43.98	19.07	Stop bailing
15.7	.5	43.64	18.73	(bailed 2 gallons)
16.2	1.0	43.36	18.45	
16.7	1.5	43.10	18.19	
17.2	2.0	42.82	17.91	
17.7	2.5	42.57	17.66	
18.2	3.0	42.27	17.36	
18.7	3.5	41.96	17.05	
19.2	4.0	41.75	16.84	
19.7	4.5	41.42	16.51	
20.2	5.0	41.21	16.30	
21.2	6.0	40.71	15.80	
22.2	7.0	40.19	15.28	
23.2	8.0	39.76	14.85	
24.2	9.0	39.32	14.41	
25.2	10.0	38.91	14.00	
26.2	11.0	38.51	13.60	
27.2	12.0	38.15	13.24	
28.2	13.0	37.88	12.97	
29.2	14.0	37.57	12.66	
30.2	15.0	37.30	12.39	
32.2	17.0	36.87	11.96	
34.2	19.0	36.51	11.60	
36.2	21.0	36.29	11.38	
38.2	23.0	36.06	11.15	
40.2	25.0	35.92	11.01	
42.2	27.0	35.76	10.85	
44.2	29.0	35.65	10.74	
46.2	31.0	35.54	10.63	
48.2	33.0	35.51	10.60	
50.2	35.0	35.45	10.54	
55.2	40.0	35.41	10.50	

60.2	45.0	35.42	10.51
65.2	50.0	35.39	10.48
70.2	55.0	35.37	10.46
75.2	60.0	35.41	10.50
80.2	65.0	35.38	10.47
85.2	70.0	35.41	10.50
90.2	75.0	35.40	10.49
95.2	80.0	35.40	10.49
100.2	85.0	35.44	10.53
110.2	95.0	35.43	10.52
120.2	105.0	35.41	10.50
130.2	115.0	35.42	10.51
140.2	125.0	35.43	10.52
150.2	135.0	35.44	10.53
160.2	145.0	35.44	10.53
170.2	155.0	35.44	10.53
180.2	165.0	35.44	10.53
190.2	175.0	35.44	10.53
200.2	185.0	35.42	10.51
215.2	200.0	35.40	10.49
230.2	215.0	35.39	10.48
245.2	230.0	35.41	10.50
260.2	245.0	35.41	10.50
275.2	260.0	35.39	10.48
290.2	275.0	35.40	10.49
305.2	290.0	35.39	10.48
320.2	305.0	35.37	10.46
335.2	320.0	35.40	10.49
350.2	335.0	35.38	10.47
380.2	365.0	35.40	10.49
1400.2	1385.0	35.72	10.81
1880.2	1865.0	35.48	10.57
2870.2	2855.0	35.49	10.58
3429.2	3414.0	35.59	10.68
4362.2	4347.0	35.63	10.72

90% recovery at
26.81'. (only recovered
70%)

AQUIFER TEST DATA

WELL 41-86



12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
** Well Number: 4186			
09/23/86	27.28	5941.83	5914.55
09/25/86	37.02	5941.83	5904.81
09/30/86	27.03	5941.83	5914.80
10/13/86	38.38	5941.83	5903.45
11/26/86	33.56	5941.83	5908.27
01/01/87	31.88	5941.83	5909.95
02/01/87	30.13	5941.83	5911.70
05/06/87	34.27	5941.83	5907.56
06/01/87	34.30	5941.83	5907.53
07/08/87	35.80	5941.83	5906.03
07/20/87	36.30	5941.83	5905.53
08/06/87	36.60	5941.83	5905.23
09/01/87	36.70	5941.83	5905.13
10/22/87	37.20	5941.83	5904.63
11/02/87	37.40	5941.83	5904.43
12/01/87	38.24	5941.83	5903.59

INDEX OF DATA

Boring No.: 42-86

Completed as well? Yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☒ Well Development Summaries
- ☒ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

Project: Rocky Flats Plant

LOG OF BORING NO.

42-86

Date Drilled 9/12/86, 9/13/86

Coordinates N 36565.8 E 24007.9

Boring Method Hollow Stem Auger

Ground Surface Elevation 5954.34

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch)		Water Content (%)		Other Tests
					20	40	20	40	
	0			ROCKY FLATS ALLUVIUM					
				0-2.0'-Sample. Recovered 0.5/2.0'=25%. GRAVEL: medium bluish gray (5B 5/1); granite and quartzite pebbles and cobbles; some clay; caliche stringers; poorly sorted; unconsolidated; dry.					
	2.5			2.5'-Cuttings. GRAVEL: Same as above; dry.					
				2.0-3.3'-Sample. Recovered 1.0/2.0'=50%. GRAVEL: medium gray (N 5); granite and quartzite pebbles and cobbles; coarse sand matrix; poorly sorted; subangular; unconsolidated; dry.					
	5			3.3-5.0'-Sample. Recovered 1.7/1.8'=94%. GRAVEL: Same as above; dry.					
				5.0-6.5'-Sample. Recovered 1.5/1.5'=100%. GRAVEL: Same as above; dry.					
	7.5			6.5-8.0'-Sample. Recovered 0.3/1.5'=22%. GRAVEL: Same as above; dry.					
				8.0-8.9'-Sample. Recovered 0.0/0.9'=0%. Drilled with center bit in augers.					
				8.9-11.5'-Sample. Recovered 0.0/2.6'=0%.					
	10								

Remarks

Logged by: C. Walker

Checked by: 

Project No.

106P06222

Hydro-Search, Inc.

Page 1 of 4

Project: Rocky Flats Plant

LOG OF BORING NO. 42-86

Date Drilled 9/12/86, 9/13/86

Coordinates N 36565.8 E 24007.9

Boring Method Hollow Stem Auger

Ground Surface Elevation 5954.34

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	10								
	12.5			11.5-13.0'-Split Spoon. Recovered 1.0/1.5'=67%. GRAVEL: grayish orange pink (5YR 7/2) to moderate brown (5YR 4/4); granitic pebbles and cobbles in sand matrix; poorly sorted; angular to subangular; unconsolidated; dry.					
	15			13.0-14.0'-Sample. Recovered 0.9/1.0'=90%. GRAVEL: grayish orange pink (5YR 7/2) to moderate brown (5YR 4/4); Same as above; dry.					
	17.5			14.0-16.0'-Sample. Recovered 2.0/2.0'=100%. GRAVEL: Same as above; dry.					
				16.0-16.5'-Sample. Recovered 0.5/0.5'=100%. GRAVEL: moderate reddish brown (10R 6/6); granitic pebbles and cobbles in sand matrix; poorly sorted; subangular to angular; unconsolidated; dry.					
				17.5-18.5'-Sample. Recovered 1.0/1.0'=100%. GRAVEL: moderate reddish brown (10R 6/6); granite and quartzite pebbles in sand matrix; poorly - sorted; subrounded to subangular; unconsolidated; dry.					
	20			18.5-20.0'-Sample. Recovered 0.0/1.5'=0%. Drilled with center bit in augers.					

Remarks

Logged by: C. Walker

Checked by: *[Signature]*

Project No.
106P06222

Hydro-Search, Inc.

Page 2 of 4

Project: Rocky Flats Plant

LOG OF BORING NO.


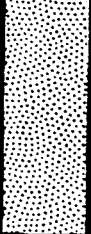


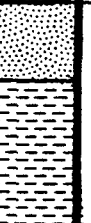
42-86

Date Drilled 9/12/86, 9/13/86

Coordinates N 36565.8 E 24007.9

Boring Method Hollow Stem Auger

Ground Surface Elevation 5954.34

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch)		Water Content (%)		Other Tests
					20	40	20	40	
	20			20.0-21.3'-Sample. Recovered 1.3/1.3'=100%. GRAVEL: moderate brown (5YR 3/4) granitic pebbles and cobbles in sand matrix; trace clay; poorly sorted; subangular; unconsolidated; wet.			▽		
	22.5			21.3-23.0'-Sample. Recovered 2.0/1.7'=118%. SAND: moderate brown (5YR 4/4); clayey; <10% granitic pebbles and cobbles; poorly sorted; subrounded to subangular; unconsolidated; wet.					
	25			23.0-25.0'-Sample. Recovered 1.3/2.0'=65%. GRAVEL: moderate yellowish brown (10YR 5/4); granitic pebbles; clayey sand matrix; poorly sorted; unconsolidated; wet.					
	27.5			25.0-27.0'-Sample. Recovered 0.0/2.0'=0%. 27.0-29.0'-Sample. Recovered 0.8/2.0'=40%. 27.0-28.6'. GRAVEL: moderate yellowish brown (10YR 5/4); granitic pebbles and coarse-grained sand (~50%); poorly sorted; unconsolidated; wet.					
	30			ARAPAHOE FORMATION 28.6-29.0'. SANDSTONE: yellowish gray (5Y 7/2); fine-grained; quartzose; well sorted; well rounded; moderately well cemented; damp.					

Remarks

Logged by: C. Walker

Checked by: 

Project No.

106P06222

Hydro-Search, Inc.

Page 3 of 4

Project: Rocky Flats Plant

LOG OF BORING NO.

42-86

Date Drilled 9/12/86, 9/13/86

Coordinates N 36565.8 E 24007.9

Boring Method Hollow Stem Auger

Ground Surface Elevation 5954.34

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	30			29.0-31.0'-Sample. Recovered 2.0/2.0'=100%. CLAYSTONE: pale olive (10Y 6/2) to light olive brown (5Y 5/6); silty; pale yellowish orange (10YR 8/6) stringers; some organic fragments; poorly consolidated; damp.					
	32.5			31.0-33.0'-Sample. Recovered 1.2/2.0'=60%. CLAYSTONE: Same as above. Grades downward into sandstone; very fine-grained; well sorted; poorly consolidated; damp.					
				33.0-35.0'. Lost core.					
	35			TOTAL DEPTH: 35.0'					
	37.5								
	40								

Remarks

Logged by: C. Walker

Checked by: 

Project No.

106P06222

Hydro-Search, Inc.

Page 4 of 4

PROGRAM SLUGT, VERSION 4.OCT. 1985

THIS PROGRAM CALCULATES MEAN TRANSMISSIVITIES FROM SLUG-TEST DATA BASED ON TWO ANALYTICAL APPROACHES:

- (1) METHOD OF COOPER, BREDEHFT AND PAPADOPULOS, 1967 (ARTICLE IN VOL.3, NO.1 OF WRR ENTITLED "RESPONSE OF A FINITE DIAMETER WELL TO AN INSTANTANEOUS CHARGE OF WATER")
- (2) METHOD OF BOUNER AND RICE, 1976 (ARTICLE IN VOL. 12, NO.3 OF WRR ENTITLED "A SLUG TEST FOR DETERMINING HYDRAULIC CONDUCTIVITY OF UNCONFINED AQUIFERS WITH COMPLETELY OR PARTIALLY PENETRATING WELLS")

PROJECT NO.: 6-0118-87

CLIENT: Rockwell International

ITE LOCATION: Rocky Flats Plant

DATE OF SLUG TEST: 10-14-87

FIELD INVESTIGATOR: Kevin McNeill

WELL NO.: 42-86

INPUT DATA ARE:

INNER CASING DIAMETER = 2.00 INCHES	LENGTH OF SCREEN OR INTAKE PORTION = 9.74 FEET
INNER SCREEN OR OPEN-HOLE DIAMETER = 2.00 INCHES	DEPTH FROM STATIC LEVEL TO BOTTOM OF SCREEN = 9.74 FEET
DIAMETER OF DRILLED HOLE = 7.50 INCHES	THICKNESS OF SATURATED AQUIFER ZONE = 9.74 FEET
ESTIMATED POROSITY OF GRAVEL PACK = .25	FALLING-HEAD INDEX = 0 ("1" IF FALLING, "0" IF RISING)
NUMBER OF HEAD-TIME DATA POINTS = 11	

TIME (sec)	HEAD (FEET)
1.00	.630
2.00	.420
3.00	.270
4.00	.170
5.00	.120
6.00	.070
7.00	.040
8.00	.030
9.00	.020
10.00	.010
15.00	.010

HO WAS COMPUTED FROM INTERCEPT OF PLOT OF LOG(H) VS. TIME

SUCCESSIVE COMPUTED
VALUES FOR HO
(FEET)

.6201
1.0397
.9989

.....

METHOD OF BOUWER AND RICE

COMPUTED RESULTS USING DIAMETER OF DRILLED HOLE:

PERMEABILITY = $1.79\text{E-}03$ FT/sec = $5.45\text{E-}02$ CM/sec

TRANSMISSIVITY = $1.74\text{E-}02$ FT²/sec

COMPUTED RESULTS USING DIAMETER OF CASING AND SCREEN:

PERMEABILITY = $5.97\text{E-}04$ FT/sec = $1.82\text{E-}02$ CM/sec

TRANSMISSIVITY = $5.82\text{E-}03$ FT²/sec

12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
** Well Number: 4286			
09/22/86	21.48	5956.43	5934.95
09/23/86	22.12	5956.43	5934.31
09/24/86	22.17	5956.43	5934.26
10/13/86	22.92	5956.43	5933.51
01/01/87	46.75	5956.43	5909.68
02/01/87	15.63	5956.43	5940.80
03/12/87	14.08	5956.43	5942.35
05/07/87	10.13	5956.43	5946.30
06/02/87	12.60	5956.43	5943.83
07/08/87	13.40	5956.43	5943.03
07/23/87	15.60	5956.43	5940.83
08/03/87	17.20	5956.43	5939.23
09/01/87	19.30	5956.43	5937.13
09/03/87	19.60	5956.43	5936.83
09/03/87	19.60	5956.43	5936.83
09/28/87	20.40	5956.43	5936.03
11/03/87	22.30	5956.43	5934.13
12/01/87	22.03	5956.43	5934.40

INDEX OF DATA

Boring No.: 43-86

Completed as well? Yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☒ Well Development Summaries
- ☐ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

Project: Rocky Flats Plant


LOG OF BORING NO. 43-86

Date Drilled 9/25/86

Coordinates N 36415.0 E 22761.7

Boring Method Hollow Stem Auger

Ground Surface Elevation 5970.39

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	0			<p>ROCKY FLATS ALLUVIUM</p> <p>0-1.0'-Sample. Recovered 1.0/1.0'=100%. GRAVEL: grayish brown (5YR 3/2); 50-60% granitic pebbles and cobbles; 30-40% sand and clay; caliche stringers; poorly sorted; unconsolidated; dry.</p> <p>1.0-3.0'-Sample. Recovered 0.0/2.0'=0%. Drilled with center bit in augers.</p> <p>3.0-3.3'-Sample. Recovered 0.2/0.3'=67%. SAND: moderate brown (5YR 4/4); 80% clayey sand; 20% quartzite cobbles; poorly sorted; unconsolidated; dry.</p> <p>3.3-4.0'-Sample. Recovered 0.0/0.7'=0%. Drilled with center bit in augers.</p> <p>4.0-5.4'-Sample. Recovered 1.0/1.4'=74%. SAND: pale yellowish brown (10YR 6/2); 60% coarse to fine- grained sand; 10-20% clay; 20% granitic pebbles; poorly sorted; unconsolidated; dry.</p> <p>5.4-5.5'-Sample. Recovered 0.2/0.2'=100%. SAND: Same as above; dry.</p> <p>5.5-6.0'-Sample. Recovered 0.0/0.5'=0%. Drilled with center bit in augers.</p> <p>6.0-8.0'-Sample. Recovered 0.9/2.0'=45%. SAND: Same as above; dry.</p>					
	2								
	4								
	6								
	8								

Remarks

Logged by: C. Walker

Checked by: 

Project No.

106P06222

Hydro-Search, Inc.

Page 1 of 3

Project: Rocky Flats Plant

LOG OF BORING NO. 43-86

Date Drilled 9/25/86

Coordinates N 36415.0 E 22761.7

Boring Method Hollow Stem Auger

Ground Surface Elevation 5970.39

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	8			8.0-10.0'-Sample. Recovered 2.2/2.0'=110%. SAND: moderate brown (5YR 4/4); fine to medium-grained sand; trace coarse-grained sand; poorly sorted; subangular; unconsolidated; dry.					
				10.0-12.0'-Sample. Recovered 1.7/2.0'=85%.					
				10.0-11.1'. SAND: Same as above; dry.					
	10			11.1-12.0'. GRAVEL: moderate brown (5YR 4/4); grades downward to coarse to medium-grained sand; poorly sorted; subangular; unconsolidated; damp.					
				12.0-14.0'-Sample. Recovered 2.0/2.0'=100%. GRAVEL: moderate brown (5YR 4/4); quartzite pebbles and cobbles (20-30%) and coarse-grained sand; poorly sorted; angular to subangular; unconsolidated; damp.					
	12			14.0-15.5'-Sample. Recovered 0.8/1.5'=53%. GRAVEL: moderate yellowish brown (10YR 5/4); granitic pebbles and cobbles to fine-grained sand; poorly sorted; unconsolidated; dry.					
				15.5-16.0'-Sample. Recovered 0.0/0.5'=0%. Drilled with center bit in augers.					
	14			16.0-16.5'-Sample. Recovered 0.5/0.5'=100%. GRAVEL: Same as above; dry.					
				ARAPAHOE FORMATION					
				16.5-18.0'-Sample. Recovered 1.3/1.5'=87%.					
	16								

Remarks

Logged by: C. Walker

Checked by: JLP

Project No.

106P06222

Hydro-Search, Inc.

Page 2 of 3

Project: Rocky Flats Plant

LOG OF BORING NO. 43-86

Date Drilled 9/25/86

Coordinates N 36415.0 E 22761.7

Boring Method Hollow Stem Auger

Ground Surface Elevation 5970.39

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	16			16.5-17.0'. CLAYSTONE: dark yellowish orange (10YR 6/6) to olive gray (5Y 5/2); consolidated; damp.					
				17.0-17.3'. SANDSTONE: yellowish gray (5Y 7/2); fine-grained; friable; moderately sorted; subangular to subrounded; friable; poorly moderately well cemented; damp.					
				17.3-17.8'. CLAYSTONE: dark yellowish orange (10YR 6/6) to olive gray (5Y 5/2); consolidated; damp.					
	18			17.8-18.0'. SANDSTONE: yellowish gray (5Y 7/2); fine-grained; friable; moderately sorted; subangular to subrounded; poorly cemented; damp.					
				18.0-20.0'-Sample. Recovered 1.5/2.0'=75%.					
				18.0-18.5'. CLAYSTONE: dark yellowish orange (10YR 6/6) to olive gray (5Y 5/2); consolidated; damp.					
	20			18.5-20.0'. SANDSTONE: yellowish gray (5Y 7/2); fine-grained; friable; moderately sorted; subangular to subrounded; poorly cemented; fractures with dusky yellow brown (10YR 2/2) mottles; damp.					
				20.0-22.0'-Sample. Recovered 2.0/2.0'=100%.					
	22			20.0-20.8'. CLAYSTONE: moderate yellowish brown (10YR 5/4) and yellowish gray (5Y 7/2); silty; laminated; poorly consoli- dated; damp.					
				20.8-22.0'. SANDSTONE: moderate yellow (5Y 7/6); medium to fine-grained; clayey; moderately sorted; subangular to subrounded; poorly cemented; damp.					
	24			TOTAL DEPTH: 22.0'					

Remarks

Logged by: C. Walker

Checked by: *[Signature]*

Project No.

106P06222

Hydro-Search, Inc.

Page 3 of 3

WELL 43-86

Hydro-Search, Inc. Reno • Denver

12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
--------------------------	------------------------------------	-------------------------------	-----------------------------------

** Well Number: 4386

10/10/86	-1.00	5972.49	
10/13/86	-1.00	5972.49	
11/26/86	16.76	5972.49	5955.73
01/01/87	18.33	5972.49	5954.16
02/01/87	16.75	5972.49	5955.74
03/11/87	15.42	5972.49	5957.07
05/08/87	13.10	5972.49	5959.39
06/02/87	14.87	5972.49	5957.62
07/07/87	14.20	5972.49	5958.29
07/27/87	16.10	5972.49	5956.39
08/04/87	16.80	5972.49	5955.69
09/01/87	16.50	5972.49	5955.99
09/29/87	18.00	5972.49	5954.49
11/03/87	18.30	5972.49	5954.19
12/01/87	16.75	5972.49	5955.74

INDEX OF DATA

Boring No.: 46-86

Completed as well? yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☒ Well Development Summaries
- ☐ Hydraulic Conductivity Test Data
and Results
- ☒ Packer Test Data and Results
- ☒ Water Level Data


LOG OF BORING NO. 46-86

Date Drilled 9/16/86, 9/17/86, 10/9/86

Coordinates N 37944.7 E 15181.3

Boring Method Casing Driver/NC Core

Ground Surface Elevation 6065.72'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests	
					20	40	20	40		
	40									
	45				44.0-52.5'-Cuttings. GRAVEL: moderate brown (5YR 4/4); 40-60% quartzite cobbles; silty and sandy matrix; poorly sorted; unconsolidated; damp.					
	50									
				52.5-53.0'-Cuttings. SAND: moderate brown (5YR 4/4); very fine-grained; silty; poorly sorted; unconsolidated; damp.						
				53.0-57.0'-Cuttings. BOULDERS: moderate brown (5YR 4/4); 60-70% granitic boulders; silty gravel matrix; poorly sorted; unconsolidated; moist.						
	55									
				57.0-63.0'-Cuttings. GRAVEL: moderate brown (5YR 4/4); 30-50% granitic pebbles and cobbles; silty sand matrix; poorly sorted; unconsolidated; moist.						
	60									

Remarks

Logged by: T. Gulliver

Checked by:

Project No.
106P06222

Hydro-Search, Inc.

Page 3 of 9

Project: Rocky Flats Plant

LOG OF BORING NO. 46-86

Date Drilled 9/16/86, 9/17/86, 10/9/86

Coordinates N 37944.7 E 15181.3

Boring Method Casing Driver/NC Core

Ground Surface Elevation 6065.72'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	80			80.0-88.0'-Cuttings. GRAVEL: moderate brown (5YR 4/4); 70% granite and quartzite pebbles and cobbles; sandy; poorly sorted; unconsolidated; moist.					
	85								
	90			88.0-90.0'-Cuttings. GRAVEL: moderate brown (5YR 4/4); granite and quartzite pebbles and cobbles; silty; poorly sorted; unconsolidated; wet.					
				LARAMIE FORMATION					
	95			90.0-96.5'-Cuttings. CLAYSTONE: dark yellowish orange (10YR 6/6); laminated; consolidated; wet.					
	100			97.0-102.0'-Sample. Recovered 0.0/5.0'. Cuttings indicate a medium light gray (N 6) claystone with black (N 1) organic wood fragments.					

Remarks

Logged by: T. Gulliver

Checked by: *LLP*

Project No.

106P06222

Hydro-Search, Inc.

Page 5 of 9

Project: Rocky Flats Plant

LOG OF BORING NO. 46-86

Date Drilled 9/16/86, 9/17/86, 10/9/86

Coordinates N 37944.7 E 15181.3

Boring Method Casing Driver/NC Core

Ground Surface Elevation 6065.72'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Foot)		Water Content (%)		Other Tests
					20	40	20	40	
	100			102.0-105.0'-Sample. Recovered 0.4/3.0'=13%. RQD=0.4/0.4'=100%. CLAYSTONE: light olive gray (5Y 5/2) to olive gray (5Y 3/2); medium light gray (N 5) mottles; dark yellowish orange (10YR 6/6) limonite stain; vertical fractures with limonite stains; fine- grained sand pocket in center of core; some wood fragments; firm; damp.					
	105			105.0-109.5'-Depth correction. CLAYSTONE: Same as above; damp.					
	110			109.5-112.5'-Sample. Recovered 0.4/3.0'=13%. RQD=0/0.4'=0%. CLAYSTONE: Same as above; iron concretions; damp.					
	115			112.5-116.5'-Sample. Recovered 3.0/4.0'=75%. RQD=0/3.0'=0%. CLAYSTONE: medium gray (N 5) to light olive gray (5Y 5/2) claystone; firm; damp.					
	120			116.5-121.5'-Sample. Recovered 2.7/5.0'=54%. RQD=2.5/2.7'=93%. CLAYSTONE: medium dark gray (N 4); light olive brown (5Y 5/2) to light olive gray (5Y 5/6) mottles; some silt; vertical fracture; firm; dry to damp.					

Remarks Logged by: T. Gulliver

Checked by: 

Project No.

106P06222

Hydro-Search, Inc.

Page 6 of 9

Project: Rocky Flats Plant

LOG OF BORING NO. 46-86

Date Drilled 9/16/86, 9/17/86, 10/9/86

Coordinates N 37944.7 E 15181.3

Boring Method Casing Driver/NC Core

Ground Surface Elevation 6065.72'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Foot)		Water Content (%)		Other Tests
					20	40	20	40	
	120			121.5-126.5'-Sample. Recovered 2.6/5.0'=52%. RQD=4.3/4.8'=90%. CLAYSTONE: medium dark gray (N 4); trace silt; unweathered; soft; sticky; damp to moist.					
	125			126.5-131.5'-Sample. Recovered 4.8/5.0'=96%. RQD=4.3/4.8'=90%.					
				126.5-126.9': CLAYSTONE: medium dark gray (N 4); trace silt; calcite filled fracture at bottom of core; firm; damp.					
	130			126.9-127.6': SANDSTONE: dark greenish gray (5GY 4/1) to dark medium gray (N 3); very silty; fine to medium-grained; moderately to poorly sorted; slightly calcareous; firm; moist.					
	135			131.5-136.5'-Sample. Recovered 1.3/5.0'=26%. RQD=0.5/1.3'=38%. CLAYSTONE: Same as above; damp.					
	140			136.5-141.5'-Sample. Recovered 2.3/5.0'=46%. RQD=0.4/2.3'=17%. CLAYSTONE: Same as above; trace very fine-grained sand beds 0.5' thick; very firm; damp.					

Remarks Logged by: T. Gulliver

Checked by: 

Project No.

106P06222

Hydro-Search, Inc.

Page 7 of 9

Project: Rocky Flats Plant

LOG OF BORING NO. 46-86

Date Drilled 9/16/86, 9/17/86, 10/9/86

Coordinates N 37944.7 E 15181.3

Boring Method Casing Driver/NC Core

Ground Surface Elevation 6065.72'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Foot)		Water Content (%)		Other Tests
					20	40	20	40	
	140			141.5-146.5'-Sample. Recovered 3.8/5.0'=76%. RQD=2.8/3.8'=74%. SILTSTONE: medium light gray (N 6); sandy; interbedded with thin to thick beds of fine to very fine-grained SANDSTONE; moderate sorting; silty; abundant convoluted contacts; beds dipping at 30 to 50 degrees; firm; damp to moist.					
	145			146.5-151.1'-Sample. Recovered 0.5/5.0'=10%. RQD=0/0.5'=0%. SILTSTONE: Same as above with some claystone; sandstone laminations in fragments; damp to moist.					
	150			151.1-154.5'-Sample. Recovered 3.0/3.0'=100%. RQD=0/3.0'=0%. SILTSTONE: Same as above with very fine-grained, medium gray (N 5) sand; damp to moist.					
	155			154.5-156.5'-Sample. Recovered 0.7/2.0'=35%. RQD=0/0.7'=0%. SILTSTONE: Same as above; medium gray (N 5) with medium dark gray (N 4) laminations of claystone; firm; damp.					
	160								

Remarks Logged by: T. Gulliver

Checked by: 

Project No.

106F06222

Hydro-Search, Inc.

Page 8 of 9

Project: Rocky Flats Plant

LOG OF BORING NO. 46-86

Date Drilled 9/16/86, 9/17/86, 10/9/86

Coordinates N 37944.7 E 15181.3

Boring Method Casing Driver/NC Core

Ground Surface Elevation 6065.72'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Foot)		Water Content (%)		Other Tests
					20	40	20	40	
160				156.5-161.5'-Sample. Recovered 5.0/5.0'=100%. RQD=4.0/5.0'=80%. SILTSTONE: Same as above with interbedded silty sandstone at 157.5' to 158.5' and 160.5' to 161.5'; sandstone is medium gray (N 4); silty; very fine to fine-grained; laminated; cross-bedded; horizontal bedding apparent; firm; tight; moist.					
165				161.5-166.5'-Sample. Recovered 2.3/5.0'=46%. RQD=0.5/2.3'=22%. SILTSTONE: Same as above; clayey; interbedded with claystone; thin (0.3') calcite cemented sandy cement; moist.					
170				TOTAL DEPTH: 166.5'					
175									
180									

Remarks Logged by: T. Gulliver

Checked by: 

Project No.

106P06222

Hydro-Search, Inc.

Page 9 of 9

WELL CONSTRUCTION SUMMARY

LOCATION or COORDS: _____
 N 37944.7 E 15181.3

ELEVATION: GROUND LEVEL 6065.72'
 TOP OF CASING 6067.89'

DRILLING SUMMARY:

TOTAL DEPTH Well: 160.79' Hole: 166.50'
 BOREHOLE DIAMETER 0.00' - 96.50': 5 5/8"
 96.50' - 166.50': 4 1/2"
 DRILLER Boyles Brothers Drilling Co.
 15865 W. 5th Ave., Golden, CO
 (Tom High, Robert Roach)
 RIG 0.00' - 96.50': Casing advancer; 96.50' - 160.79': Piling
 BIT(S) 0.00' - 96.50': Down hole hammer
 96.50' - 166.50': Coring bit
 DRILLING FLUID 0.00' - 96.50': None
 96.50' - 166.50': air/water mist
 SURFACE CASING 5" x 98.5' steel w/ locking cap

WELL DESIGN:

BASIS: GEOLOGIC LOG X GEOPHYSICAL LOG _____

CASING STRING(S): C=CASING S=SCREEN

0.00'	96.50'	C1			
0.00'	140.33'	C2			
140.33'	160.79'	S1			

CASING: C1 5" I.D. steel surface casing
 C2 2" I.D. Sch. 5 type 316 stainless steel, threaded and flush
 C3 jointed.
 C4 jointed.

SCREEN: S1 2" I.D. Sch. 5 type 316 stainless steel, threaded and flush
 S2 jointed, 0.010" wirewrap screen.
 S4 0.25' welded bottom cap.

CENTRALIZERS Type 304 stainless steel
 150.49' - 151.66'

FILTER MATERIAL 32-42 silica sand
 138.90' - 163.00'

CEMENT Portland Type I
 0.00' - 138.90'

OTHER 3/8" bentonite pellets
 137.50' - 138.90'
 163.00' - 165.00'

CONSTRUCTION TIME LOG:

TASK	START		FINISH	
	DATE	TIME	DATE	TIME
DRILLING:	1986		1986	
5 5/8" casing	9/16	0840	9/16	1643
advancer	10/9	1100	10/15	1645
NC Core	10/20	1030	10/20	1511
Reaming	10/20	1310	10/20	1511
GEOPHYS. LOGGING:				
CASING:				
5" steel	9/16	0840	9/16	1643
2" stainless	10/21	1600	10/21	1645
FILTER PLACEMENT:	10/21	1645	10/21	1120
CEMENTING:	10/22	1228	10/23	1000
DEVELOPMENT:	10/30	1050	11/13	1100
OTHER:				
Bentonite	10/22	1602	10/22	1605
	10/22	1140	10/22	1150
Packer testing	10/16	0829	10/19	1030

WELL DEVELOPMENT

See Well Development Summary Sheet.

COMMENTS:

Water encountered at 60' during drilling.

Top of stainless steel casing: 2.17'

Cave from TD to 165.00'

WELL 46-86

Hydro-Search, Inc.

CONSULTING HYDROLOGISTS-GEOLOGISTS

PACKER TEST ANALYSIS

WELL NO. 46-86

ROCKY FLATS PLANT JOB NO. 106P06222

DATE TESTED: 10/17/86 BY: C. WALKER

TEST INTERVAL (FEET BELOW G.S.): 130.22 - 140.25

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 20.00

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00035200 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 10.03 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 20.00 + 5.90 + 1.98 * 2.31 = 30.47

R = BOREHOLE RADIUS = .16 FEET

K = HYDRAULIC CONDUCTIVITY = .00000076 FT/MIN

K = .00000038 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00097071 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 10.03 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 20.00 + 5.90 + 28.30 * 2.31 = 91.27

R = BOREHOLE RADIUS = .16 FEET

K = HYDRAULIC CONDUCTIVITY = .00000070 FT/MIN

K = .00000035 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00025588 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 10.03 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 20.00 + 5.90 + 1.70 * 2.31 = 29.83

R = BOREHOLE RADIUS = .16 FEET

K = HYDRAULIC CONDUCTIVITY = .00000056 FT/MIN

K = .00000029 CM/SEC

PACKER TEST ANALYSIS

WELL NO. 46-86

ROCKY FLATS PLANT JOB NO. 106P06222

DATE TESTED: 10/17/86 BY: C. WALKER

TEST INTERVAL (FEET BELOW G.S.): 140.64 - 150.67

MATERIAL TESTED: ARAPAHOE SANDSTONE

DEPTH TO WATER (FEET BELOW G.S.): 20.00

$$K = \frac{Q}{2(PI)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00003385 (FEET3/MIN)

L = LENGTH OF TEST INTERVAL = 10.03 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 20.00 + 5.90 + 1.80 * 2.31 = 30.06

R = BOREHOLE RADIUS = .16 FEET

K = HYDRAULIC CONDUCTIVITY = .00000007 FT/MIN

K = .00000004 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00299201 (FEET3/MIN)

L = LENGTH OF TEST INTERVAL = 10.03 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 20.00 + 5.90 + 30.50 * 2.31 = 96.35

R = BOREHOLE RADIUS = .16 FEET

K = HYDRAULIC CONDUCTIVITY = .00000203 FT/MIN

K = .00000103 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00043865 (FEET3/MIN)

L = LENGTH OF TEST INTERVAL = 10.03 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 20.00 + 5.90 + 1.90 * 2.31 = 30.29

R = BOREHOLE RADIUS = .16 FEET

K = HYDRAULIC CONDUCTIVITY = .00000095 FT/MIN

K = .00000048 CM/SEC

PACKER TEST ANALYSIS

WELL NO. 46-86

ROCKY FLATS PLANT JOB NO. 106P06222

DATE TESTED: 10/17/86 BY: C. WALKER

TEST INTERVAL (FEET BELOW G.S.): 151.00 - 161.03

MATERIAL TESTED: ARAPAHOE SANDSTONE

DEPTH TO WATER (FEET BELOW G.S.): 20.00

$$K = \frac{Q}{2(\pi)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00005415 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 10.03 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 20.00 + 5.90 + 1.80 * 2.31 = 30.06

R = BOREHOLE RADIUS = .16 FEET

K = HYDRAULIC CONDUCTIVITY = .00000012 FT/MIN

K = .00000006 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00044542 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 10.03 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 20.00 + 5.90 + 33.25 * 2.31 = 102.71

R = BOREHOLE RADIUS = .16 FEET

K = HYDRAULIC CONDUCTIVITY = .00000028 FT/MIN

K = .00000014 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00000000 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 10.03 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 20.00 + 5.90 + 1.90 * 2.31 = 30.29

R = BOREHOLE RADIUS = .16 FEET

K = HYDRAULIC CONDUCTIVITY = .00000000 FT/MIN

K = .00000000 CM/SEC

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
** Well Number: 4686			
10/30/86	100.27	6067.89	5967.62
11/03/86	137.21	6067.89	5930.68
11/04/86	150.00	6067.89	5917.89
11/05/86	150.00	6067.89	5917.89
11/07/86	150.00	6067.89	5917.89
11/10/86	150.00	6067.89	5917.89
11/11/86	145.52	6067.89	5922.37
11/12/86	157.43	6067.89	5910.46
11/13/86	157.71	6067.89	5910.18
11/26/86	143.35	6067.89	5924.54
01/01/87	85.19	6067.89	5982.70
02/01/87	78.00	6067.89	5989.89
03/31/87	74.23	6067.89	5993.66
05/06/87	72.25	6067.89	5995.64
06/01/87	112.20	6067.89	5955.69
07/08/87	117.20	6067.89	5950.69
08/03/87	92.20	6067.89	5975.69
08/13/87	87.90	6067.89	5979.99
09/28/87	158.50	6067.89	5909.39
11/02/87	105.70	6067.89	5962.19

INDEX OF DATA

Boring No.: 48-86

Completed as well? yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☐ Well Development Summaries
- ☐ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

Project: Rocky Flats Plant


LOG OF BORING NO.

48-86

Date Drilled 9/18/86, 9/19/86, 10/23/86 - 11/13/86 Coordinates N 36079.2 E 15168.7

Boring Method Casing Driver/NC Core

Ground Surface Elevation 6079.68'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	20								
	25								
	30								
	35			33.0-35.0'-Cuttings. BOULDER: large quartzite boulder.					
	40			35.0-46.0'-Cuttings. GRAVEL: moderate brown (10YR 4/4); granitic pebbles and cobbles; 15- 30% sand; poorly sorted; unconsolidated; damp.					

Remarks

Logged by: T. Gulliver & T. Murphy

Checked by: 

Project No.
106P06222

Hydro-Search, Inc.


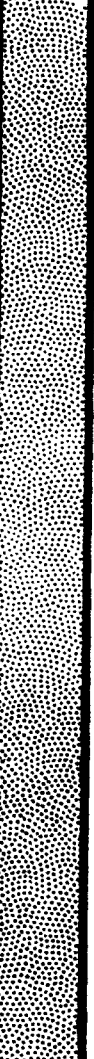
Page 2 of 11

Project: Rocky Flats Plant

LOG OF BORING NO. 48-86

Date Drilled 9/18/86, 9/19/86, 10/23/86 - 11/13/86 **Coordinates** N 36079.2 E 15168.7

Boring Method Casing Driver/NC Core **Ground Surface Elevation** 6079.68'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
40									
45									
				46.0-60.0'-Cuttings. SAND: moderate brown (10YR 4/4); 20-30% granitic pebbles and cobbles; sand and silt matrix; poorly sorted; unconsolidated; moist to wet.					
50									
55									
60									

Remarks Logged by: T. Gulliver & T. Murphy

Checked by: 

Project No.
106P06222

Hydro-Search, Inc.

Page 3 of 11

Project: Rocky Flats Plant


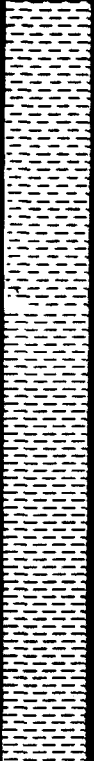
LOG OF BORING NO.

48-86

Date Drilled 9/18/86, 9/19/86, 10/23/86 - 11/13/86 Coordinates N 36079.2 E 15168.7

Boring Method Casing Driver/NC Core

Ground Surface Elevation 6079.68'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	60			60.0-70.0'-Cuttings. GRAVEL: moderate brown (10YR 4/4); 50-60% granite and quartzite pebbles and cobbles; silty sand matrix; poorly sorted; unconsolidated; wet.					
	65								
	70			70.0-74.0'-Cuttings. CLAYSTONE: light olive gray (5Y 5/2); laminated; soft; wet.					
	75			74.0-79.0'-Sample. Recovered 0.3/5.0'=6%. RQD=0/0.3'=0%. CLAYSTONE: medium light gray (N 6/0); abundant wood fragments; trace silt; abundant fractures with limonite stain (10YR 6/6); soft to moderately firm; damp.					
	80			79.0-84.0'-Sample. Recovered 2.8/5.0'=56%. RQD=2.6/2.8'=93%.					

Remarks

Logged by: T. Gulliver & T. Murphy

Checked by: 

Project No.

106P06222

Hydro-Search, Inc.

Page 4 of 11

Project: Rocky Flats Plant

LOG OF BORING NO.

48-86

Date Drilled 9/18/86, 9/19/86, 10/23/86 - 11/13/86 Coordinates N 36079.2 E 15168.7

Boring Method Casing Driver/NC Core

Ground Surface Elevation 6079.68'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Foot)		Water Content (%)		Other Tests
					20	40	20	40	
	80			79.0-81.2': CLAYSTONE: same as above; yellowish gray (5YR 7/2); soft; iron stained. 81.2-82.2': IRONSTONE; dark reddish brown (10R 3/4); mottled with olive gray (5Y 3/2) claystone; grades into yellowish gray (5Y 7/2) to light gray claystone at 82.3 to 84.0'; trace silt; abundant vertical and horizontal fractures with limonite stains (10YR 6/6); firm to hard; damp.					
	85			84.0-89.0'-Sample. Recovered 5.0/5.0'=100%. RQD=3.6/5.0'=72%. CLAYSTONE: medium light gray (N 5/0) to medium gray (N 4/0); silty in places; wood fragments; subvertical and hori- zontal fractures with limonite stain (10YR 6/6); no apparent bedding; highly fractured; soft to moderately firm; damp.					
	90			89.0-94.0'-Sample. Recovered 4.0/5.0'=80%. RQD=4.0/4.0'=100%. 89.0-90.8': SILTSTONE: medium light gray (N 4/0); fine sand and clay; grades down into claystone; subvertical fractures (60- 80°) to subhorizontal fractures; firm; damp. 90.8-94.0': CLAYSTONE: same as 84.0-89.0'; fractures at 92.4-94.0'; coated with limonite stain (10YR 6/6); firm; damp.					
	95			94.0-99.0'-Sample. Recovered 4.6/5.0'=92%. RQD=2.8/4.6'=61%. CLAYSTONE: same as above; light olive gray (5Y 5/2); numerous horizontal and subhorizontal thin ironstone and limonite layers (<.01") with					
	100								

Remarks

Logged by: T. Gulliver & T. Murphy

Checked by: *SGP*Project No.
106P06222

Hydro-Search, Inc.

Page 5 of 11

Project: Rocky Flats Plant

LOG OF BORING NO. 48-86

Date Drilled 9/18/86, 9/19/86, 10/23/86 - 11/13/86 Coordinates N 36079.2 E 15168.7

Boring Method Casing Driver/NC Core

Ground Surface Elevation 6079.68'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Foot)		Water Content (%)		Other Tests
					20	40	20	40	
	100			ironstone fragments; altered wood fragments; interbedded fine sandy clayey siltstone beds; 0.8' thick; firm; damp.					
				99.0-104.0'-Sample. Recovered 1.4/5.0'=28%. RQD=1.0/1.4'=71%. SILTSTONE: light olive gray (5YR 5/2) to medium light gray (N 5/0); trace very fine sand; clayey; limonite fractures (horizontal).					
	105			104.0-109.0'-Sample. Recovered 2.9/5.0'=58%. RQD= 1.9/2.9'=66%. CLAYSTONE: light medium gray (N 4/10) to dark yellowish orange (10YR 6/6); numerous subhorizontal limonite stained fractures; soft; damp to moist.					
	110			109.0-112.0'-Sample. Recovered 3.0/3.0'=100%. RQD= 2.9/3.0'=97%. SILTSTONE: medium gray to dark gray (N 4/0 to N 3/0); trace sand; clayey; carbonaceous; occasional thin claystone beds; yellowish gray (5Y 7/2) concretions; slightly calcareous.					
	115			Depth correction: total depth of borehole=114.2'.					
				114.2-117.2'-Sample. Recovered 2.9/3.0'=97%. RQD=0.7/2.9'=24%. SILTSTONE: same as above with sandy laminations; calcite cemented layer (0.2'); few yellowish gray (5Y 7/2) concretions; firm; damp.					
	120								

Remarks

Logged by: T. Gulliver & T. Murphy

Checked by: Project No.
106P06222

Hydro-Search, Inc.

Page 6 of 11

Project: Rocky Flats Plant

LOG OF BORING NO. 48-86

Date Drilled 9/18/86, 9/19/86, 10/23/86 - 11/13/86 Coordinates N 36079.2 E 15168.7

Boring Method Casing Driver/NC Core

Ground Surface Elevation 6079.68

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Foot) 20 40	Water Content (%) 20 40	Other Tests
	120			117.2-122.2'-Sample. Recovered 4.6/5.0'=92%. RQD=3.5/4.6'=76%. SILTSTONE: dark to medium gray (N 5/0 to N 3/0); interbedded layers of silty sandstone; sandy siltstone and clayey siltstone; bed 0.1 to 0.2'-thick; carbonaceous; calcareous from 121.0-122.2'; bedding dips from 40-50° in upper 117.2-119.0' then shallows to 15-20° in upper 117.2-119.0' then shallows to 15-20° at bottom of core; flaser bedding characteristics; firm; damp.			
	125			122.2-127.2'-Sample. Recovered 1.6/5.0'=32%. RQD=0.7/1.6'=44%. SILTSTONE: same as above; damp to moist.			
	130			127.2-132.2'-Sample. Recovered 5.0/5.0'=100%. RQD=3.2/5.0'=64%. SILTSTONE: medium gray (N 4/0); trace sand; clayey; vertical and horizontal calcite filled fractures at 128.5-129.5'; carbonaceous fragments; bedding appears massive; firm to hard; damp.			
	135			132.2-137.7'-Sample. Recovered 4.0/5.0'=80%. RQD=0.0/4.0'=0%. SILTSTONE: medium light gray (N 6/0); clayey; sandy; interbedded layers of silty sandstone; very fine-grained; tight; firm; damp.			
	140			137.2-142.2'-Sample. Recovered 5.0/5.0'=100%. RQD=3.2/5.0'=64%. 137.2-138.0': SILTY SANDSTONE: very fine- grained; cemented with calcite.			

Remarks

Logged by: T. Gulliver & T. Murphy

Checked by: Project No.
106P06222

Hydro-Search, Inc.

Page 7 of 11

Project: Rocky Flats Plant

LOG OF BORING NO. 48-86

Date Drilled 9/18/86, 9/19/86, 10/23/86 - 11/13/86 Coordinates N 36079.2 E 15168.7

Boring Method Casing Driver/NC Core

Ground Surface Elevation 6079.68'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Foot)		Water Content (%)		Other Tests
					20	40	20	40	
	140			138.0-142.2': CLAYEY SILTSTONE: concretion layer at 138.2 to 138.8'; subvertical calcite vein at 139.0; firm; damp.					
				142.2-147.2'-Sample. Recovered 4.6/5.0'=93%. RQD=1.6/4.6'=35%. SILTSTONE: medium dark gray (N 4/0); trace sand; clayey; carbonaceous layers.					
	145								
				147.2-152.2'-Sample. Recovered 3.9/5.0'=78%. RQD=1.3/3.9'=33%. 147.2-151.3': SILTSTONE: same as above; firm; damp. 151.3-152.2': SANDSTONE: silty; laminations of siltstone; very fine- grained; convoluted bedding; 20°-30° dip; firm; damp.					
	150								
				152.2-157.2'- Sample. Recovered 4.3/5.0'=86%. RQD=1.2/4.3'=28%. 152.2-153.0': SILTY SANDSTONE: as above.					
				153.0-157.2': SILTSTONE: medium gray (N 5/0); clayey; trace sand; carbonaceous; firm; damp.					
	155								
				157.2-162.2'-Sample. recovered 3.4/5.0'= 68%. RQD=0.6/3.4'=18%. SILTSTONE: same as above; damp.					
	160								

Remarks

Logged by: T. Gulliver & T. Murphy

Checked by: *[Signature]*Project No.
106P06222

Hydro-Search, Inc.

Page 8 of 11

Project: Rocky Flats Plant

LOG OF BORING NO.

48-86

Date Drilled 9/18/86, 9/19/86, 10/23/86 - 11/13/86 Coordinates N 36079.2 E 15168.7

Boring Method Casing Driver/NC Core

Ground Surface Elevation 6079.68'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Foot)		Water Content (%)		Other Tests
					20	40	20	40	
160				162.2-167.2'-Sample. Recovered 4.0/5.0'=80%. RQD=0.8/4.0'=20%. SILTSTONE: same as above; alternating layers of clayey siltstone and sandy siltstone; beds average 0.25' thick; appear to be close to horizontal; firm; damp.					
165				167.2-173.0'-Sample. Recovered 1.0/6.0'=17%. RQD=0.0/1.0'=0%. SILTSTONE: medium dark gray (N 4/0); clayey; trace sand; abundant carbonaceous fragments; moderately firm; damp on fresh surface.					
170				173.0-178.0'-Sample. Recovered 4.3/5.0'=86%. RQD=3.4/4.3'=79%. SILTSTONE: same as above; damp.					
175				178.0-183.0'-Sample. Recovered 4.0/5.0'=80%. RQD=1.2/4.0'=30%. SILTSTONE: same as above with coaly layer at 179.3' to 179.7'; highly fractured from 181.0- 183.0'; firm; damp.					
180									

Remarks

Logged by: T. Gulliver & T. Murphy

Checked by: Project No.
106P06222

Hydro-Search, Inc.

Page 9 of 11

Project: Rocky Flats Plant

LOG OF BORING NO. 48-86

Date Drilled 9/18/86, 9/19/86, 10/23/86 - 11/13/86 Coordinates N 36079.2 E 15168.7

Boring Method Casing Driver/NC Core

Ground Surface Elevation 6079.68'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Foot)		Water Content (%)		Other Tests
					20	40	20	40	
	180								
				183.0-187.0'-Sample. Recovered 2.7/4.0'=68%. RQD=0.5/2.7'=19%. SILTSTONE: same as above; clayey; highly fractured throughout; firm; damp.					
	185								
				187.0-192.0'-Sample. Recovered 3.9/5.0'=78%. RQD=0.0/3.9'=0%. SILTSTONE: same as above; less clay-rich; trace very fine-grained sand; coarser silt; fractured; damp.					
	190								
				192.0-197.0'-Sample. Recovered 4.2/5.0'=84%. RQD=3.0/4.2'=71%. SILTSTONE: similar to above; coarser grained; less clay; trace very fine-grained sand; grades to interbedded silty sandstone and sandy siltstone at 194.5'; thin to thick bedded; highly convoluted contacts; abundant pene- contemporaneous deforma- tion characteristics; bedding appears flat; firm; damp to moist.					
	195								
				197.0-202.0'-Sample. Recovered 5.0/5.0'=100%. RQD=1.1/5.0'=22%. SANDSTONE: medium dark gray (N 4/0); fine to very fine-grained; silty, interbedded with siltstone and sandy siltstone; thin to thick bedded; convoluted; 50% sandstone; 50% siltstone; firm to soft; wet.					
	200								

Remarks

Logged by: T. Gulliver & T. Murphy

Checked by: Project No.
106P06222

Hydro-Search, Inc.

Page 10 of 11

Project: Rocky Flats Plant

LOG OF BORING NO. 48-86

Date Drilled 9/18/86, 9/19/86, 10/23/86 - 11/13/86 Coordinates N 36079.2 E 15168.7

Boring Method Casing Driver/NC Core

Ground Surface Elevation 6079.58'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Foot)		Water Content (%)		Other Tests
					20	40	20	40	
	200			202.0-207.0'-Sample. Recovered 4.6/5.0'=92%. RQD=2.8/4.6'=61%. SANDSTONE: medium light gray (N 6/0); very fine to medium-grained; poorly sorted; interbedded with siltstone and clayey siltstone; flaser bedding common; beds range from .001' to 1' in thickness; firm; wet.					
	205			207.0-212.0'-Sample. Recovered 4.2/5.0'=84%. RQD=0.9/4.2'=21%.					
				207.0-208.3': SANDSTONE: same as above.					
	210			208.3-212.0': SILTSTONE: dark gray (N 3/0); interbedded with medium gray (N 5/0); coaly; bedding is convoluted; appears horizontal.					
				TOTAL DEPTH: 212.0'					
	215								
	220								

Remarks

Logged by: T. Gulliver & T. Murphy

Checked by: Project No.
106P06222

Hydro-Search, Inc.

Page 11 of 11

WELL CONSTRUCTION SUMMARY

LOCATION or COORDS: _____

ELEVATION: GROUND LEVEL 6079.68'

N 36079.2 E 15168.7

TOP OF CASING 6082.37'

DRILLING SUMMARY:

TOTAL DEPTH Well: 207.07' Hole: 238.00'
 BOREHOLE DIAMETER 0.00' - 78.30': 5 5/8"
78.00' - 212.00': 4 3/4" 212.00' - 238.00': 4"
 DRILLER Boyles Brothers Drilling Co.
15865 W. 5th Avenue, Golden, CO
(Tom High, Robert Roach)
 RIG 0.00' - 78.30': Casing advancer; 78.30'
- 238.00': Pailing
 BIT(S) 0.00' - 78.30': Down hole hammer; 78.30'
- 212.00': Coring bit; 212.00' - 238.00': Chop
rod
 DRILLING FLUID 0.00' - 78.30': None
78.30' - 238.00': Air/water mist to drill,
bentonite mud to ream.
 SURFACE CASING 5" x 78.4' steel w/ locking
cap

WELL DESIGN:

BASIS: GEOLOGIC LOG X GEOPHYSICAL LOG _____

CASING STRING(S): C=CASING S=SCREEN

0.00'	78.40'	C1	_____	_____	_____
0.00'	191.99'	C2	_____	_____	_____
191.99'	207.07'	S1	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

CASING: C1 5" I.D. steel surface casing
 C2 2" I.D. Sch. 5 type 316 stain-
less steel, threaded and flush
jointed.

SCREEN: S1 2" I.D. Sch. 5 type 316 stain-
less steel, threaded and flush
jointed, 0.010" wire wrap
screen, 0.25' welded bottom cap.

CENTRALIZERS Type 304 stainless steel
199.27' - 200.47'

FILTER MATERIAL 32-42 silica sand
188.50' - 209.00'

CEMENT Portland Type I
0.00' - 186.00'

OTHER 3/8" bentonite pellets
186.00' - 188.50'
209.00' - 238.00'

CONSTRUCTION TIME LOG:

TASK	START		FINISH	
	DATE	TIME	DATE	TIME
DRILLING:	1986		1986	
<u>5 5/8" casing</u>	9/18	1024	9/19	1110
<u>advancer</u>	10/23	1310	10/28	1500
<u>NC Core</u>	11/13	1500	11/13	1630
<u>Reaming</u>	—	—	—	—
GEOPHYS. LOGGING:	—	—	—	—
CASING:				
<u>5" steel</u>	9/18	1024	9/19	1110
<u>2" stainless</u>	11/14	0838	11/14	0900
	11/13	1631	11/14	1342
FILTER PLACEMENT:	11/17	0857	11/18	1142
CEMENTING:				
DEVELOPMENT:				
OTHER:				
<u>Bentonite</u>	11/14	1630	11/14	1645
	11/13	1600	11/13	1631
<u>Packer testing</u>	10/29	0730	11/3	1135

WELL DEVELOPMENT

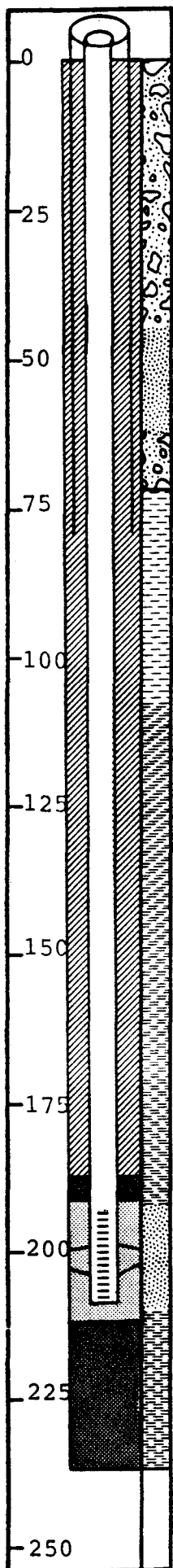
See Well Development Summary Sheet.

COMMENTS:

No water encountered during drilling.Top of stainless steel casing: 2.69'Well built through 4" casing.
 LOCATION Rocky Flats Plant
 PERSONNEL T. Gulliver/T. Murphy

PROJECT 106F06222

PROJECT



Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
** Well Number: 4886			
11/19/86	15.85	6082.37	6066.52
11/20/86	154.67	6082.37	5927.70
12/11/86	68.21	6082.37	6014.16
12/12/86	150.00	6082.37	5932.37
12/15/86	134.04	6082.37	5948.33
12/16/86	150.00	6082.37	5932.37
01/01/87	63.96	6082.37	6018.41
02/01/87	59.29	6082.37	6023.08
03/31/87	57.83	6082.37	6024.54
05/06/87	64.02	6082.37	6018.35
06/01/87	59.00	6082.37	6023.37
07/08/87	69.65	6082.37	6012.72
08/03/87	60.20	6082.37	6022.17
08/24/87	58.70	6082.37	6023.67
09/28/87	61.70	6082.37	6020.67
11/02/87	58.90	6082.37	6023.47

INDEX OF DATA

Boring No.: 49-86

Completed as well? yes


Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☐ Well Development Summaries
- ☐ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

LOG OF BORING NO. 49-86

Coordinates N 36054.3 E 15169.3
Ground Surface Elevation 6079.83'


Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Foot) 20 40	Water Content (%) 20 40	Other Tests
	0			ROCKY FLATS ALLUVIUM			
				0-7'-Cuttings. GRAVEL: moderate brown (5YR 4/4); silty; abundant quartzite; micaceous; 2% gravel limonite coated; dry.			
	5						
					7.0-13.0'-Cuttings. GRAVEL: Same as above with no limonite coatings; dry.		
	10						
					13.0-16.0'-Cuttings. GRAVEL: moderate brown (5YR 4/4); silty; sandy; poorly sorted; subangular; 20-30% fines; damp.		
	15						
					16.0-26.0'-Cuttings. GRAVEL: moderate brown (5YR 4/4); silty; sandy; 10% silt; 30% sand; poorly sorted; subangular; moist.		
	20						

Checked by: 

Page 1 of 4

LOG OF BORING NO. 49-86

Coordinates N 36054.3 E 15169.3
Ground Surface Elevation 6079.83'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Foot)		Water Content (%)		Other Tests	
					20	40	20	40		
	20									
	25		26.0-32.0'-Cuttings. GRAVEL: moderate brown (5YR 4/4); silty; abundant boulders; 5% silt; moist.							
							</			

Remarks

Logged by: T. Gulliver

Checked by :

Project No.
106P06222

Hydro-Search, Inc.

Page 2 of 4

Project: Rocky Flats Plant

LOG OF BORING NO. 49-86

Date Drilled 10/16/86

Coordinates N 36054.3 E 15169.3

Boring Method Casing Driver

Ground Surface Elevation 6079.83'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Foot)		Water Content (%)		Other Tests
					20	40	20	40	
	40			40.0-49.0'-Cuttings. GRAVEL: moderate brown (5YR 4/4); silty; sandy; poorly sorted; subangular; silt 20%; sand 20-30%; moist.					
	45								
	50			49.0-50.0'-Cuttings. SAND: light brown (5YR 5/6); fine-grained; well sorted; subrounded; damp.					
	55			50.0-56.0'-Cuttings. GRAVEL: moderate brown (5YR 4/4); sandy; silty; gravel 10-20%; sand 20- 30%; poorly sorted; subangular; moist.					
	60			56.0-57.0'-Cuttings. GRAVEL: moderate brown (5YR 4/4); coarse, sandy gravel; moderately well sorted; rounded; wet.					
				57.0-64.0'-Cuttings. GRAVEL: moderate brown (5YR 4/4); silty; sandy; silt 10%; coarse to medium-grained sand 20- 30%; subrounded; wet.					

Remarks

Logged by: T. Gulliver

Checked by: *HP*

Project No.
106P06222

Hydro-Search, Inc.

Page 3 of 4

LOG OF BORING NO. 49-86

Date Drilled 10/16/86

Coordinates N 36054.3 E15169.3

Boring Method	Casing Driver
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20
21	21
22	22
23	23
24	24
25	25
26	26
27	27
28	28
29	29
30	30
31	31
32	32
33	33
34	34
35	35
36	36
37	37
38	38
39	39
40	40
41	41
42	42
43	43
44	44
45	45
46	46
47	47
48	48
49	49
50	50
51	51
52	52
53	53
54	54
55	55
56	56
57	57
58	58
59	59
60	60
61	61
62	62
63	63
64	64
65	65
66	66
67	67
68	68
69	69
70	70
71	71
72	72
73	73
74	74
75	75
76	76
77	77
78	78
79	79
80	80
81	81
82	82
83	83
84	84
85	85
86	86
87	87
88	88
89	89
90	90
91	91
92	92
93	93
94	94
95	95
96	96
97	97
98	98
99	99
100	100

Ground Surface Elevation 6079.83'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Foot)		Water Content (%)		Other Tests
					20	40	20	40	
	60								
				64.0-66.0'-Cuttings. GRAVEL: moderate brown (5YR 4/4); sandy; silty; fine to medium-grained sand 20%; silt 30%; wet.					
	65			66.0-67.0'-Cuttings. GRAVEL: moderate brown (5YR 4/4); silty; sandy; 20% gravel; 30% medium- grained sand; poorly sorted; very wet.					
				67.0-67.5'-Cuttings. CLAY: moderate brown (5YR 4/4); sandy; silty; plastic; soft; wet.					
	70			67.5-68.0'-Cuttings. SAND: moderate brown (5YR 4/4); gravelly; silty 5%; wet.					
				LARAMIE FORMATION					
				68.0-69.0'-Cuttings. CLAYSTONE: light olive gray (5Y 5/2); subplastic; damp.					
	75			69.0-70.0'-Cuttings. SILTSTONE: light olive gray (5Y 5/2); subplastic; damp.					
				70.0-74.0'-Cuttings. CLAYSTONE: medium gray (N 5); laminated; damp.					
	80			TOTAL DEPTH: 74.0'					

Remarks

Logged by: T. Gulliver

Checked by:

Project No.
106P06222

Hydro-Search, Inc.

Page 4 of 4

WELL CONSTRUCTION SUMMARY

LOCATION or COORDS: _____
N 36054.3 E 15169.3

ELEVATION: GROUND LEVEL 6032.15'
TOP OF CASING 6079.83'

DRILLING SUMMARY:

TOTAL DEPTH Well: 67.60' Hole: 74.00'
BOREHOLE DIAMETER 5 5/8"

DRILLER. Boyles Brothers Drilling Co.
15865 W. 5th Avenue, Golden, CO
 (Arrow Drilling, Tom High)

RIG Casing advancer
BIT(S) Down hole hammer

DRILLING FLUID None

SURFACE CASING 5" x 4.40' steel w/ locking cap

WELL DESIGN:

BASIS: GEOLOGIC LOG X GEOPHYSICAL LOG

CASING STRING(S): C= CASING S=SCREEN

[illegible]

CASING: C1 2" I.D. Sch. 5 type 316 stain-
less steel, threaded and flush
jointed.

SCREEN: SI 2" I.D. Sch. 5 type 316 stain-
less steel, threaded and flush
jointed, 0.010" wire wrap screen,
0.25' welded bottom cap.

CENTRALIZERS Type 304 stainless steel
58.80' - 60.05'

FILTER MATERIAL 32-42 silica sand
3.57' - 69.00'

CEMENT Portland Type I
0.00' - 2.40'

OTHER 3/8" bentonite pellets
2.40' - 3.57'
69.00' - 74.00'

CONSTRUCTION TIME LOG:

<u>TASK</u>	<u>START</u>		<u>FINISH</u>	
	<u>DATE</u> 1986	<u>TIME</u>	<u>DATE</u> 1986	<u>TIME</u>
DRILLING:				
<u>5 5/8" casing</u>	<u>10/16</u>	<u>0900</u>	<u>10/16</u>	<u>1515</u>
<u>advancer</u>				
GEOPHYS. LOGGING:	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>
CASING:				
<u>2" stainless</u>	<u>10/17</u>	<u>1230</u>	<u>10/17</u>	<u>1246</u>
FILTER PLACEMENT:	<u>10/17</u>	<u>1250</u>	<u>10/20</u>	<u>0900</u>
CEMENTING:	<u>10/17</u>	<u>1000</u>	<u>10/17</u>	<u>1100</u>
DEVELOPMENT:				
OTHER:				
<u>Bentonite</u>	<u>10/17</u>	<u>1225</u>	<u>10/17</u>	<u>1246</u>
	<u>10/20</u>	<u>0920</u>	<u>10/20</u>	<u>0925</u>

WELL DEVELOPMENT

See Well Development Summary Sheet.

COMMENTS:

Water encountered at 52' during drilling.

Top of stainless steel casing: 2.32'

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
--------------------------	------------------------------------	-------------------------------	-----------------------------------

** Well Number: 4986

11/19/86	46.87	6082.15	6035.28
11/21/86	48.35	6082.15	6033.80
11/24/86	49.00	6082.15	6033.15
01/01/87	49.46	6082.15	6032.69
02/01/87	49.50	6082.15	6032.65
03/31/87	49.02	6082.15	6033.13
05/06/87	47.15	6082.15	6035.00
06/01/87	45.27	6082.15	6036.88
07/08/87	41.40	6082.15	6040.75
08/03/87	54.00	6082.15	6028.15
08/24/87	44.00	6082.15	6038.15
09/28/87	44.90	6082.15	6037.25
11/02/87	44.60	6082.15	6037.55


INDEX OF DATA


Boring No.: 50-86

Completed as well? yes

Data in File

☒ Log of Borehole
☒ Well Construction Summaries
☒ Well Development Summaries
☐ Hydraulic Conductivity Test Data
and Results
☐ Packer Test Data and Results
☒ Water Level Data

Project:		Rocky Flats Plant		LOG OF BORING NO.		50-86	
Date Drilled		10/7/86		Coordinates N 34881.1 E 14170.8			
Boring Method		Casing Driver		Ground Surface Elevation 6103.95			
Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch) 20 40	Water Content (%) 20 40	Other Tests
	60						
	65						
	70						
	75						
	80						
				75.0-92.0'-Cuttings. GRAVEL: moderate brown (5YR 4/4); granitic pebbles and cobbles; ~20% medium to coarse-grained sand and silty sand; poorly sorted; subangular; unconsolidated; damp.			

Remarks Logged by: T. Gulliver Checked by: 

Project No. **Hydro-Search, Inc.** Page 4 of 6

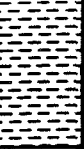
106P06222

Project: Rocky Flats Plant

LOG OF BORING NO. 50-86

Date Drilled 10/7/86
Boring Method Casing Driver

Coordinates N 34881.1 E 14170.8
Ground Surface Elevation 6103.95

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	100								
				TOTAL DEPTH: 102.0'					
	105								
	110								
	115								
	120								

Remarks Logged by: T. Gulliver

Checked by: 

Project No.
106P06222

Hydro-Search, Inc.

Page 6 of 6

WELL CONSTRUCTION SUMMARY

LOCATION or COORDS: _____

N 34881.1 E 14170.8

ELEVATION: GROUND LEVEL 6103.95'

TOP OF CASING 6105.14'

DRILLING SUMMARY:

TOTAL DEPTH Well: 96.15' Hole: 102.00'

BOREHOLE DIAMETER 0.00' - 37.00': 5 5/8"
37.00' - 102.00': 5"DRILLER Boyles Brothers Drilling Co.
15865 W. 5th Avenue, Golden, CO
(Arrow Drilling, Tom High)

RIG Casing advancer

BIT(S) Down hole hammer

DRILLING FLUID None

SURFACE CASING 5" x 4.13' steel w/ locking
cap

WELL DESIGN:

BASIS: GEOLOGIC LOG X GEOPHYSICAL LOG _____

CASING STRING(S): C=CASING S=SCREEN

0.00'	2.90'	C1	-	-	-
2.90'	96.15'	S1	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

CASING: C1 2" I.D. Sch. 5 type 316 stain-
less steel, threaded and flush
jointed.SCREEN: S1 2" I.D. Sch. 5 type 316 stain-
less steel, threaded and flush
jointed, 0.010" wire wrap screen,
0.25' welded bottom cap.CENTRALIZERS Type 304 stainless steel
85.71' - 86.95'
92.93' - 94.10'FILTER MATERIAL 16-40 silica sand
2.40' - 96.15'CEMENT Portland Type I
0.00' - 1.60'OTHER 3/8" bentonite pellets
1.60' - 2.40'

CONSTRUCTION TIME LOG:

TASK	START		FINISH	
	DATE 1986	TIME	DATE 1986	TIME
DRILLING: 5 5/8" & 5" casing advancer	10/7	0820	10/7	1400
GEOPHYS. LOGGING:	—	—	—	—
CASING: 2" stainless	10/14	1052	10/14	1105
FILTER PLACEMENT	10/14	1200	10/14	1440
CEMENTING:	10/14	1450	10/14	1500
DEVELOPMENT:	10/23	1355	10/31	1045
OTHER: Bentonite	10/14	1440	10/14	1441

WELL DEVELOPMENT

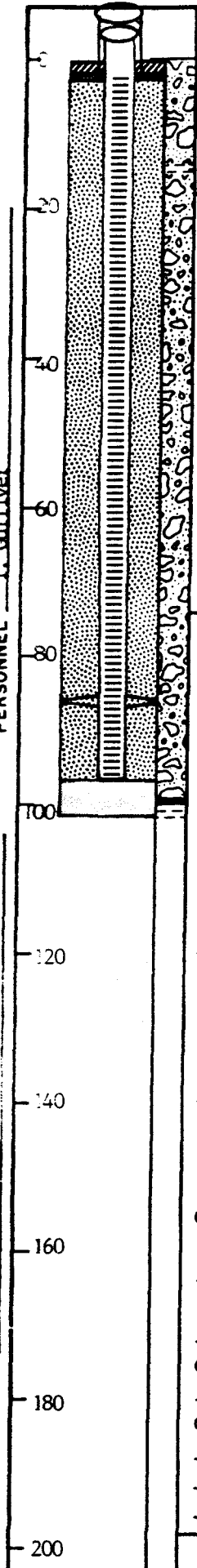
See Well Development Summary Sheet.

COMMENTS:

Water encountered at 49' during drilling.

Top of stainless steel casing: 1.19'

Cave from TD to 95.15'

LOCATION Golden, CO
PERSONNEL T. GulliverPROJECT 106P06222
Rocky Flats Plant

WELL 50-86

CONSULTING HYDROLOGISTS-GEOLOGISTS

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
** Well Number: 5086			
10/23/86	49.50	6105.14	6055.64
10/27/86	49.25	6105.14	6055.89
10/28/86	49.46	6105.14	6055.68
10/31/86	49.35	6105.14	6055.79
11/26/86	49.32	6105.14	6055.82
01/01/87	49.33	6105.14	6055.81
03/31/87	49.52	6105.14	6055.62
05/06/87	49.08	6105.14	6056.06
06/01/87	47.65	6105.14	6057.49
07/08/87	47.00	6105.14	6058.14
08/03/87	47.60	6105.14	6057.54
08/14/87	46.40	6105.14	6058.74
09/28/87	46.50	6105.14	6058.64
11/02/87	46.00	6105.14	6059.14

INDEX OF DATA

Boring No.: 51-86

Completed as well? yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☒ Well Development Summaries
- ☐ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

Project: Rocky Flats Plant


LOG OF BORING NO. 51-86

Date Drilled 10/22/86

Coordinates N 35683.1 E 13014.5

Boring Method Casing Driver

Ground Surface Elevation 6123.99'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Foot)		Water Content (%)		Other Tests
					20	40	20	40	
	0			ROCKY FLATS ALLUVIUM 0-5.0'-Cuttings. GRAVEL: moderate brown (5YR 4/4); sandy; 10-20% sand; poorly sorted; limonitic; dry.					
	5			5.0-17.0'-Cuttings. GRAVEL: Same as above; abundant quartzite boulders; dry.					
	10								
	15			17.0-20.0'-Cuttings. GRAVEL: moderate brown (5YR 4/4); sandy; silty; 10% sand; 20-30% gravel; damp.					
	20								

Remarks

Logged by: T. Gulliver

Checked by: 

Project No.

106P06222

Hydro-Search, Inc.

Page 1 of 5

Project: Rocky Flats Plant




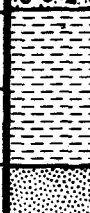
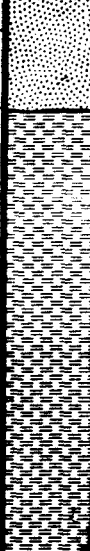
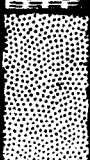
LOG OF BORING NO. 51-86

Date Drilled 10/22/86

Coordinates N 35683.1 E 13014.5

Boring Method Casing Driver

Ground Surface Elevation 6123.99'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Foot)		Water Content (%)		Other Tests
					20	40	20	40	
	20			20.0-22.0'-Cuttings. SAND AND GRAVEL: moderate brown (5YR 4/4); poorly sorted; subangular; gravel 40%; damp.					
				22.0-28.0'-Cuttings. GRAVEL: moderate brown (5YR 4/4); sandy; silty; 10-20% sand; poorly sorted; subangular; moist.					
	25								
				28.0-30.0'-Cuttings. CLAY: moderate brown (5YR 4/4); 10-20% gravel; plastic; wet.					
	30								
				30.0-32.0'-Cuttings. SAND: moderate brown (5YR 4/4); 5% gravel; silty; poorly sorted; subangular; wet.					
				32.0-38.0'-Cuttings. SILT: moderate brown (5YR 4/4); sandy; gravelly; 20% sand; moderate sorting; subrounded; 20-30% gravel; damp.					
	35								
				38.0-45.0'-Cuttings. SAND: light brown (5YR 5/6); fine-grained; 5% gravel; moderate sorting; subrounded; dry.					
	40								

Remarks

Logged by: T. Gulliver

Checked by: 

Project No.

106P06222

Hydro-Search, Inc.

Page 2 of 5

Project: Rocky Flats Plant

LOG OF BORING NO. 51-86

Date Drilled 10/22/86

Coordinates N 35683.1 E 13014.5

Boring Method Casing Driver

Ground Surface Elevation 6123.99'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Foot)		Water Content (%)		Other Tests
					20	40	20	40	
	40								
	45			45.0-55.0'-Cuttings. BOULDER GRAVEL: pale yellowish brown (10YR 6/2); abundant quartzite and quartz sandstone; dry.					
	50								
	55			55.0-74.0'-Cuttings. BOULDER GRAVEL: same as above; silty; damp.					
	60								

Remarks

Logged by: T. Gulliver

Checked by: *WSP*

Project No.

106P06222

Hydro-Search, Inc.

Page 3 of 5

LOG OF BORING NO. 51-86

Coordinates N 35683.1 E 13014.5
Ground Surface Elevation 6123.99'

[illegible]

Checked by:

Hydro-Search, Inc.

Page 4 of 5

Project:

Rocky Flats Plant

LOG OF BORING NO.

51-86

Date Drilled

10/22/86

Coordinates N 35683.1 E 13014.5

Boring Method

Casing Driver

Ground Surface Elevation 6123.99'

Casing Driver

[illegible]

Remarks

Logged by: T. Gulliver

Checked by:

Project No.

106P06222

Hydro-Search, Inc.

Page 5 of 5

WELL CONSTRUCTION SUMMARY

LOCATION or COORDS: _____
N 35683.1 E 13014.5ELEVATION: GROUND LEVEL 6123.99'
TOP OF CASING 6126.51'

DRILLING SUMMARY:

TOTAL DEPTH Well: 79.06' Hole: 94.00'

BOREHOLE DIAMETER 5 5/8"

DRILLER Boyles Brothers Drilling Co.
15865 W. 5th Avenue, Golden, CO
(Arrow Drilling, Tom High)

RIG Casing advancer

BIT(S) Down hole hammer

DRILLING FLUID None

SURFACE CASING 5" x 5.4' steel w/ locking cap

WELL DESIGN:

BASIS: GEOLOGIC LOG ☒ GEOPHYSICAL LOG _____

CASING STRING(S): C=CASING S=SCREEN

0.00' 4.83' C1 _____

4.83' 79.06' S1 _____

CASING: C1 2" I.D. Sch. 5 type 316 stain-
C2 less steel, threaded and flush
C3 jointed.

C4 _____

SCREEN: S1 2" I.D. Sch. 5 type 316 stain-
S2 less steel, threaded and flush
S3 jointed, 0.010" wire wrap screen,
S4 0.25' welded bottom cap.CENTRALIZERS Type 304 stainless steel
72.58' - 73.82'FILTER MATERIAL 32-42 silica sand
4.00' - 80.30'CEMENT Portland Type I
0.00' - 3.10'OTHER 3/8" bentonite pellets
3.10' - 4.00'
80.30' - 85.00'

CONSTRUCTION TIME LOG:

TASK	START		FINISH	
	DATE 1986	TIME	DATE 1986	TIME
DRILLING: 5 5/8" casing advancer	10/22	0830	10/22	1700
GEOPHYS. LOGGING:	—	—	—	—
CASING: 2" stainless	10/23	1150	10/23	1200
FILTER PLACEMENT:	10/23	1200	10/23	1430
CEMENTING:	10/23	1505	10/23	1510
LEVELCPMENT:	10/27	1230	11/7	1420
OTHER: Bentonite	10/23	1440	10/23	1445
	10/23	1050	10/23	1150

WELL DEVELOPMENT

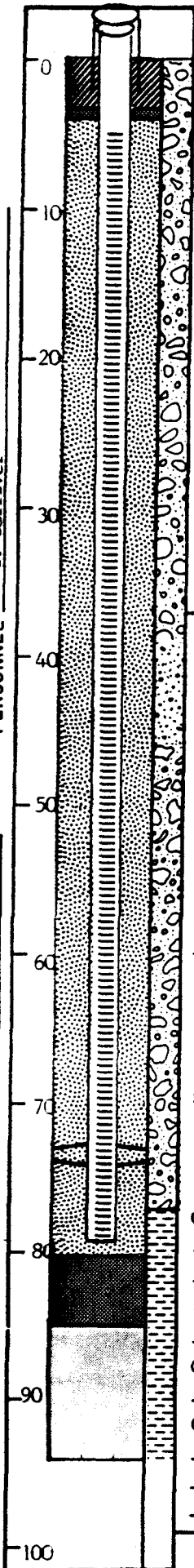
See Well Development Summary Sheet.

COMMENTS:

No water encountered during drilling.

Top of stainless steel casing: 2.52'

Cave from TD to 85'

LOCATION Golden, CO
PERSONNEL T. GulliverPROJECT 106P06222
Rocky Flats Plant

WELL 51-86

Hydro-Search, Inc. Reno • Denver CONSULTING HYDROLOGISTS-GEOLOGISTS

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
** Well Number: 5186			
10/27/86	58.17	6126.51	6068.34
10/29/86	52.89	6126.51	6073.62
10/30/86	47.50	6126.51	6079.01
11/03/86	55.83	6126.51	6070.68
11/05/86	60.73	6126.51	6065.78
11/06/86	61.88	6126.51	6064.63
11/07/86	61.10	6126.51	6065.41
11/26/86	60.88	6126.51	6065.63
01/01/87	62.69	6126.51	6063.82
02/23/87	61.60	6126.51	6064.91
03/31/87	56.85	6126.51	6069.66
05/06/87	53.75	6126.51	6072.76
06/01/87	46.90	6126.51	6079.61
07/08/87	47.50	6126.51	6079.01
08/03/87	50.00	6126.51	6076.51
08/19/87	50.80	6126.51	6075.71
09/28/87	77.50	6126.51	6049.01
11/02/87	58.90	6126.51	6067.61

INDEX OF DATA

Boring No.: 52-86

Completed as well? yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☐ Well Development Summaries
- ☐ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

Project: Rocky Flats Plant

LOG OF BORING NO. 52-86

Date Drilled 10/20/86 and 11/17/86 to
11/20/86

Coordinates N 35714.8 E 13010.8

Boring Method Casing Driver/NC Core

Ground Surface Elevation 6124.00'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Foot)		Water Content (%)		Other Tests
					20	40	20	40	
	0			ROCKY FLATS ALLUVIUM					
				0-7.0'-Cuttings. GRAVEL: moderate brown (5YR 4/4); 20% sand; limonitic; poorly sorted; angular; dry.					
	5			7.0-16.0'-Cuttings. GRAVEL: moderate brown (5YR 4/4); 20% silt; poorly sorted; angular; dry to damp.					
	10			Perched water table at 12.0'.					
	15			16.0-20.0'-Cuttings. GRAVELLY SANDY SILT: moderate brown (5YR 4/4); silty; 20% gravel; 30% sand; angular; moist.					
	20								

Remarks

Logged by: T. Gulliver and T. Murphy

Checked by: *[Signature]*

Project No.
106P06222

Hydro-Search, Inc.

Page 1 of 8

Project: Rocky Flats Plant

LOG OF BORING NO. 52-86

Date Drilled 10/20/86 and 11/17/86 to 11/20/86

Coordinates N 35714.8 E 13010.8

Boring Method Casing Driver/NC Core

Ground Surface Elevation 6124.00'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Foot)		Water Content (%)		Other Tests
					20	40	20	40	
	20			20.0-22.0'-Cuttings. GRAVELLY SAND: moderate yellowish brown (10YR 5/4); poorly sorted; subangular; moist.					
				22.0-29.0'-Cuttings. GRAVELLY SILTY SAND: Same as above; 30% gravel; wet.					
	25								
				29.0-30.0'-Cuttings. CLAY: moderate yellowish brown (10YR 5/4); 10-20% gravel; plastic; moist.					
	30			30.0-32.0'-Cuttings. SAND: moderate brown (5YR 4/4); silty and gravelly; 20% gravel; 30% sand; subangular; damp.					
				32.0-33.0'-Cuttings. GRAVELLY SANDY SILT: moderate brown (5YR 4/4); 20-40% boulders; poorly sorted; damp.					
	35			33.0-37.0'-Cuttings. GRAVEL: moderate yellow- ish brown (10YR 5/4); abundant quartzite, sandstone and pink granitoids; sandy; poorly sorted; subangular; damp.					
	40								

Remarks Logged by: T. Gulliver and T. Murphy

Checked by: Project No.
106P06222

Hydro-Search, Inc.

Page 2 of 8

Rocky Flats Plant

LOG OF BORING NO.


52-86

Date Drilled 10/20/86 and 11/17/86 to 11/20/86

Coordinates N 35714.8 E 13010.8

Boring Method Casing Driver/NC Core

Ground Surface Elevation 6124.00'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Foot)		Water Content (%)		Other Tests
					20	40	20	40	
60				69.0-70.0'-Cuttings. GRAVEL: moderate brown (5YR 4/4); silty; poorly sorted; subangular; damp.					
65				70.0-72.0'-Cuttings. CLAY: grayish brown (5YR 3/2); sandy; carbon and mica common; plastic; damp.					
70				LARAMIE FORMATION					
75				72.0-76.0'-Cuttings. CLAYSTONE: light olive brown (5Y 5/6) to light olive gray (5Y 5/6); plastic to subplastic; damp.					
80				76.0-80.0'-Cuttings. CLAYSTONE AND SILTSTONE: light olive gray (5Y 5/6); interbedded; subplastic; damp.					

Remarks

Logged by: T. Gulliver and T. Murphy

Checked by:

Project No.

106P06222

Hydro-Search, Inc.

Page 4 of 8

Project: Rocky Flats Plant

LOG OF BORING NO. 52-86

Date Drilled 10/20/86 and 11/17/86 to
11/20/86
Boring Method Casing Driver/NC CoreCoordinates N 35714.8 E 13010.8
Ground Surface Elevation 6124.00'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Foot)		Water Content (%)		Other Tests
					20	40	20	40	
	80			80.0-88.0'-Cuttings. SILTSTONE AND CLAYSTONE: dusky yellow (5Y 6/4); nonplastic; damp.					
	85								
	90			88.0-93.0'-Sample. Recovered 4.0/5.0'=80%. RQD=2.0/4.0'=50%. SILTSTONE: yellowish gray (5Y 7/2) stained in bands; dark yellowish orange (10YR 6/6); sandy; trace clay; beds 1-3" thick of silty sandstone; apparent dip of 10-15°; iron nodules present; soft; damp.					
	95			93.0-98.0'-Sample. Recovered 1.7/5.0'=34%. RQD= 1.7/1.7'=100%. CLAYSTONE: light olive gray (5Y 5/2); stained along fractures moderate yellow (5Y 7/6); trace silt; bedding dipping 15- 20°; some bedding plane fractures with iron stains; also present subvertical fractures; some stained; soft; damp.					
	100								

Remarks

Logged by: T. Gulliver and E. Murphy

Checked by: Project No.
106P06222

Hydro-Search, Inc.

Page 5 of 8

Project: Rocky Flats Plant

LOG OF BORING NO. 52-86

Date Drilled 10/20/86 and 11/17/86 to
11/20/86

Coordinates N 35714.8 E 13010.8

Boring Method Casing Driver/NC Core

Ground Surface Elevation 6124.00'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Foot)		Water Content (%)		Other Tests
					20	40	20	40	
	100			98.0-101.5'-Sample. Recovered 2.7/3.5'=77%. RQD=0.6/2.7'=22%. CLAYSTONE: light olive gray (5Y 5/2) grading to grayish red (5R 4/2) to yellowish gray (5Y 4/2); highly fractured and stained; iron stained fractures are subvertical 60°; lower portion of core becoming more silty.					
	105			101.5-106.5'-Sample. Recovered 0.4/5.0'=8%. RQD=0/0.4'=0%. SANDSTONE: light gray (N 7/0); medium to very fine- grained; 10-20% mafics; mostly quartz; silica cement; hard; damp to wet.					
	110			106.5-108.5'-Sample. Recovered 0.0/2.0'=0%. 108.5-111.5'-Sample. Recovered 0.8/3.0'=27%. RQD=0.0/0.8'=0%. SANDSTONE: same as 101.5- 106.5' with dark yellowish orange stained siltstone (10YR 6/6) interbedded with sandstone; medium to fine-grained; very silty; cross-bedded; hard; damp.					
	115			111.5-114.5'-Sample. Recovered 1.0/3.0'=33%. RQD=0.0/3.0'=0%. SANDSTONE: same as above; light gray stained in band; dark yellowish orange (at high angles 60- 70°); very silty and clayey; bedding appears to be similar to staining; soft; damp to wet.					
	120								

Remarks

Logged by: T. Gulliver and T. Murphy

Checked by: *[Signature]*

Project No.

106B06222

Hydro-Search, Inc.

Page 6 of 8

Project: Rocky Flats Plant

LOG OF BORING NO. 52-86

Date Drilled 10/20/86 and 11/17/86 to
11/20/86

Coordinates N 35714.8 E 13010.8

Boring Method Casing Driver/NC Core

Ground Surface Elevation 6124.00'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Foot)		Water Content (%)		Other Tests
					20	40	20	40	
	120			114.5-118.0'-Sample. Recovered 3.0/3.5'=86%. RQD= 0/3.0'=0%. SANDSTONE: yellowish gray (5Y 7/2); medium to very fine-grained; interbedded with silty sandstone and clayey siltstone; dark yellowish orange stains (10YR 6/6) throughout; appears in bands at 60-70° from horizontal; soft; damp.					
	125			118.0-123.0'-Sample. Recovered 3.0/5.0'=60%. RQD=2.7/3.0'=90%. SANDSTONE: yellowish gray (5Y 7/2); bounded with dark yellowish orange (10YR 6/6); fine to very fine-grained; grades into silty sandstone, sandy siltstone and clayey siltstone; beds are 0.3- 0.8 ft. thick; bedding is dipping 35°-40° from horizontal; some cross bedding; cut and fill structures; banding of iron stain follows bedding; soft; wet.					
	130			123.0-128.0'-Sample. Recovered 4.0/5.0'=80%. RQD=3.4/4.0'=85%. SANDSTONE: same as above; dips of bedding at 40-45°; wet.					
	135			128.0-133.0'-Sample. Recovered 1.3/5.0'=26%. RQD=1.0/1.3'=77%. SILTSTONE: yellowish gray (5Y 3/2); banded iron stain; sandy; sand clayey layers; soft; wet.					
	140								

Remarks

Logged by: T. Gulliver and T. Murphy

Checked by: 

Project No.

106P06222

Hydro-Search, Inc.

Page 7 of 8

Project: Rocky Flats Plant

LOG OF BORING NO. 52-86

Date Drilled 10/20/86 and 11/17/86 to
11/20/86
Boring Method Casing Driver/NC CoreCoordinates N 35714.8 E 13010.8
Ground Surface Elevation 6124.00'

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Foot)		Water Content (%)		Other Tests
					20	40	20	40	
	140			133.0-136.0'-Sample. Recovered 2.8/3.0'=93%. RQD=0.6/2.8'=21%. SILTSTONE: similar to above with alternating layers of sandy siltstone and clayey siltstone; dark gray (N 3/0) with occasional dark yellowish orange (10YR 6/6) layers; wood fragments; highly fractured; bedding appears to be at very high angles (40-60°); firm; damp.					
	145			136.0-141.0'-Sample. Recovered 1.6/5.0'=32%. RQD=0.6/1.6'=38%. SILTSTONE: same as above; calcareous cement; dark gray (N 3/0) layer of laminated siltstone and fine-grained sandstone; light gray (N 5/0) to dark gray (N 3/0); hard; damp.					
	150			141.0-145.0'-Sample. Recovered 4.2/4.0'=105%. RQD=2.0/4.2'=97%. SILTSTONE: same as above.					
	155			145.0-149.0'-Sample. Recovered 2.3/4.0'=57%. RQD=2.0/2.3'=87%. SILTSTONE: dark gray (N 3/0); clayey; some sandstone beds (.2 to .4' thick); sandstones and silty, very fine to fine- grained; color change to medium light gray (N 5/0); 50-60° dip; firm; damp.					
				149.0-154.0'-Sample. Recovered 3.5/5.0'=70%. RQD=2.0/3.5'=57%. SILTSTONE: same as above.					
				TOTAL DEPTH: 153.50'					
	160								

Remarks

Logged by: T. Gulliver and T. Murphy

Checked by: Project No.
106P06222

Hydro-Search, Inc.

Page 8 of 8

WELL CONSTRUCTION SUMMARY

 LOCATION or COORDS: _____
 N 35714.8 E 13010.8

 ELEVATION: GROUND LEVEL 6124.00'
 TOP OF CASING 6126.69'

DRILLING SUMMARY:

TOTAL DEPTH Well: 125.65 Hole: 155.80'
 BOREHOLE DIAMETER 0.00' -76.00': 5 5/8"
76.00 - 153.20' : 4 3/4"
 DRILLER Boyles Brothers Drilling Co.
15865 W. 5th Ave., Golden, CO
(Robert Roach)
0.00' -76.00': Casing advancer;
76.00' -155.80': Falling
 BIT(S) 0.00' -76.00': Down-hole hammer
76.00' -155.80': Coring bit.
 DRILLING FLUID Air/Water mist and
11-22 bentonite mud.
 SURFACE CASING 5" x 76.0' steel w/ lock-
ing cap

WELL DESIGN:

BASIS: GEOLOGIC LOG X GEOPHYSICAL LOG _____
 CASING STRING(S): C=CASING S=SCREEN
0.00' 73.45' C1 _____
0.00' - 92.00' C2 _____
92.00' - 125.80' S1 _____

CASING: C1 5" I.D. steel surface casing
 C2 2" I.D. Sch. 5 type 316 stain-
less steel, threaded and flush
jointed.
 SCREEN: S1 2" I.D. Sch. 5 type 316 stain-
less steel, threaded and flush
jointed, 0.010" wire wrapped
screen, 0.25' welded bottom cap.

CENTRALIZERS Note
 FILTER MATERIAL 16-40 silica sand
87.00' - 125.80'

 CEMENT Portland Type I
0.00' -85.00'

 OTHER 3/8" bentonite pellets
85.00' - 90.00'
128.00' - 147.00'

CONSTRUCTION TIME LOG:

TASK	START		FINISH	
	DATE 1986	TIME	DATE 1986	TIME
DRILLING:				
5 5/8" casing	10/20	0820	10/20	1455
advancer	11/17	1500	11/19	1600
IC Core				
Reaming	11/20	0900	11/24	1000
GEOPHYS. LOGGING:	—	—	—	—
CASING:				
5" steel	10/20	0820	10/20	1455
2" stainless	11/26	0900	11/26	0930
FILTER PLACEMENT:	11/26	0930	11/26	1500
CEMENTING:	11/26	1600	11/26	1730
DEVELOPMENT:				
OTHER:				
Bentonite	11/26	1500	11/26	1600
	11/25	1145	11/25	1200
Packer testing	11/20	0730	11/20	1700

WELL DEVELOPMENT

See Well Development Summary Sheet.

COMMENTS:

No water encountered during drilling.
Top of stainless steel casing: 2.55'
Well built through 4" casing.
11/22-Used bentonite mud drilling
fluid.
11/25-Washed hole with 2400 gallons
of water
11/26-Pulled 4" casing & lost 18.05
ft of casing in hole. Broke off
from 129.0 - 147.0

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
** Well Number: 5286			
12/11/86	64.64	6126.69	6062.05
12/12/86	70.05	6126.69	6056.64
12/15/86	68.90	6126.69	6057.79
01/01/87	68.79	6126.69	6057.90
02/23/87	68.10	6126.69	6058.59
03/31/87	68.56	6126.69	6058.13
05/06/87	68.60	6126.69	6058.09
06/01/87	68.20	6126.69	6058.49
07/08/87	68.20	6126.69	6058.49
08/03/87	67.50	6126.69	6059.19
08/18/87	68.90	6126.69	6057.79
09/28/87	67.40	6126.69	6059.29
11/02/87	67.70	6126.69	6058.99

INDEX OF DATA

Boring No.: 54-86

Completed as well? yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☐ Well Development Summaries
- ☐ Hydraulic Conductivity Test Data
and Results
- ☒ Packer Test Data and Results
- ☒ Water Level Data

Project: Rocky Flats Plant

LOG OF BORING NO.


54-86

Date Drilled 9/22/86, 10/9/86

Coordinates N 32292.9 E 15216.1

Boring Method Casing Driver/NC Core

Ground Surface Elevation 6103.39

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	0			ROCKY FLATS ALLUVIUM 0-5.0'-Cuttings. BOULDERS: moderate brown (5YR 4/4); 70% quartzite boulders; 30% sandy silt; iron staining; poorly sorted; unconsolidated; dry. 5.0-8.0'-Cuttings. GRAVELS: moderate brown (5YR 4/4); granite and quartzite pebbles and cobbles; 20-30% quartzite boulders; some silty sand; iron staining; poorly sorted; unconsolidated; dry. 8.0-15.0'-Cuttings. BOULDERS: granite and quartzite. 15.0-32.0'-Cuttings. GRAVEL: moderate brown (5YR 4/4); granitic pebbles and cobbles; silty; 5% granitic boulders; poorly sorted; unconsolidated; damp.					
	5								
	10								
	15								
	20								

Remarks

Logged by: T. Gulliver & L. Pivonka

Checked by: 

Project No.

106P06222

Hydro-Search, Inc.

Page 1 of 5

Project: Rocky Flats Plant


LOG OF BORING NO. 54-86

Date Drilled 9/22/86, 10/9/86

Coordinates N 32292.9 E 15216.1

Boring Method Casing Driver/NC Core

Ground Surface Elevation 6103.39

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	20								
	25								
	30								
	32.0-34.0'			32.0-34.0'-Cuttings. GRAVEL: moderate brown (5YR 4/4); 30-40% granite and quartzite cobbles and boulders; some silty sand; poorly sorted; unconsolidated; moist.					
	34.0-36.0'			34.0-36.0'-Cuttings. SILT: dark yellowish orange (10YR 6/6); sandy; very fine-grained; moderate sorting; unconsolidated; moist.					
				LARAMIE FORMATION					
	36.0-49.5'			36.0-49.5'-Cuttings. CLAYSTONE: light olive gray (5Y 5/2); some dark yellowish orange (10YR 6/6) mottles; weak lamination; damp.					
	40								

Remarks Logged by: T. Gulliver & L. Pivonka

Checked by: 

Project No.
106P06222

Hydro-Search, Inc.

Page 2 of 5

Rocky Flats Plant

LOG OF BORING NO.

54-86

Date Drilled 9/22/86, 10/9/86

Coordinates N 32292.9 E 15216.1

Boring Method Casing Driver/NC Core

Ground Surface Elevation 6103.39

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch)		Water Content (%)		Other Tests
					20	40	20	40	
	40								
	45								
	50			49.5-50.0'-Cuttings. CLAYSTONE: brownish gray (5YR 4/1); weak lamination; damp.					
	55			50.6-55.6'-Sample. Recovered 5.0/5.0'=100%. CLAYSTONE: medium gray (N 5) and light olive gray (5Y 6/1); greasy; some FeO partings/stringers; trace of carbonaceous partings; moist.					
	60			55.6-60.6'-Sample. Recovered 5.0/5.0'=100%. CLAYSTONE: light olive gray (5Y 6/1); greasy; abundant FeO mottling; heavy concretions of FeO from 57.2-57.6'; moist.					

Remarks

Logged by: T. Gulliver & L. Pivonka

Checked by:

Project No.

106P06222

Hydro-Search, Inc.

Page 3 of 5

Project: Rocky Flats Plant

LOG OF BORING NO. 54-86

Date Drilled 9/22/86, 10/9/86

Coordinates N 32292.9 E 15216.1

Boring Method Casing Driver/NC Core

Ground Surface Elevation 6103.39

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch)		Water Content (%)		Other Tests
					20	40	20	40	
	60			60.6-65.6'-Sample. Recovered 5.0/5.0'=100%. CLAYSTONE: light olive gray (5Y 6/1); greasy; abundant FeO mottling and concretions; mottling and concretion content increases with depth; moist to wet.					
	65			65.6-70.6'-Sample. Recovered 5.0/5.0'=100%. SANDY CLAYSTONE: light olive gray (5Y 6/1) to medium dark gray (N 4); some fine-grained sand; heavy FeO concretions from 65.6-65.9'; sand content increases with depth; moist.					
	70			70.6-73.6'-Sample. Recovered 3.0/3.0'=100%. SANDSTONE: dark gray (N 4) to dark yellowish orange (10YR 6/6); clay- rich; very fine-grained; <1.0' of interval is free of clay; well sorted; moist to wet.					
	75			73.6-75.6'-Sample. Recovered 2.0/2.0'=100%. CLAYSTONE: medium dark gray (N 4); greasy claystone with trace of FeO stringers; moist.					
	80			75.6-80.6'-Sample. Recovered 5.0/5.0'=100%. SANDSTONE: medium gray (N 5); fine-grained; some clay; clay content decreases with depth; trace CaCO ₃ ; well sorted; wet.					

Remarks

Logged by: T. Gulliver & L. Pivonka

Checked by: *HP*

Project No.

106P06222

Hydro-Search, Inc.

Page 4 of 5

Project: Rocky Flats Plant

LOG OF BORING NO.

54-86

Date Drilled 9/22/86, 10/9/86

Coordinates N 32292.9 E 15216.1

Boring Method Casing Driver/NC Core

Ground Surface Elevation 6103.39

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch)		Water Content (%)		Other Tests
					20	40	20	40	
	80			80.6-84.7'-Sample. Recovered 3.9/4.1'=95%. SANDSTONE: medium dark gray (N 4); fine-grained; some clay-rich sandstone and pure clay interlayers; interlayers are gradation- al and account for 20% of the interval; wet.					
	85			84.7-89.6'-Sample. Recovered 3.4/4.9'=69%. SANDY CLAYSTONE: medium dark gray (N 4); 20-30% fine-grained sand; sand content varies gradationally through this interval; moist to wet.					
				TOTAL DEPTH: 89.6'.					
	90								
	95								
	100								

Remarks

Logged by: T. Gulliver & L. Pivonka

Checked by: 

Project No.
106P06222

Hydro-Search, Inc.

Page 5 of 5

WELL 54-86

WELL CONSTRUCTION SUMMARY

LOCATION or COORDS: _____

N 32296.9 E 15216.1

ELEVATION: GROUND LEVEL 6103.39'

TOP OF CASING 6105.03'

DRILLING SUMMARY:

TOTAL DEPTH Well: 85.25' Hole: 97.00'

BOREHOLE DIAMETER 0.00' - 49.50': 5 5/8"

49.50' - 97.00': 4 3/4"

DRILLER Boyles Brothers Drilling Co.

15865 W. 5th Avenue

Golden, CO (Tom High, Jim Horn)

RIG 0.00-49.50': casing advancer, 49.50-97.00': mobile D-77

BIT(S) 0.00' - 49.50': down hole hammer

49.50' - 97.00': Carbide bit, tricone bit

DRILLING FLUID none

SURFACE CASING 5" x 49.70' steel w/ locking cap

WELL DESIGN:

BASIS: GEOLOGIC LOG ☒ GEOPHYSICAL LOG _____

CASING STRING(S): C=CASING S=SCREEN

0.00' 47.70' C1 _____ - _____

0.00' 75.43' C2 _____ - _____

75.43' 85.24' S1 _____ - _____

CASING: C1 5" I.D. steel surface casing

C2 2" I.D. Sch. 5 type 316 stainless steel, threaded and flush jointed.

SCREEN: S1 2" I.D. Sch. 5 type 316 stainless steel, threaded and flush jointed, 0.010" wire wrap screen, 0.25' welded bottom cap.

CENTRALIZERS None (See comments)

FILTER MATERIAL 32-42 silica sand
74.20' - 85.75'CEMENT Portland Type I
0.00' - 72.00'OTHER 3/8" bentonite pellets
72.00' - 74.20'
85.75' - 89.60'

CONSTRUCTION TIME LOG:

TASK	START		FINISH	
	DATE	TIME	DATE	TIME
DRILLING:	1986		1986	
5 5/8" casing	9/22	1210	9/22	1655
advancer	10/9	1249	10/10	1100
NC Core	10/13	1222	10/13	1056
Reaming	10/13	1222	10/13	1056
GEOPHYS. LOGGING:	-	-	-	-
CASING:				
5" steel	9/22	1210	9/22	1655
2" stainless	10/16	1215	10/16	1245
FILTER PLACEMENT:	10/16	1209	10/16	1415
CEMENTING:	10/16	1550	10/17	0946
DEVELOPMENT:				
OTHER:				
Bentonite	10/16	1415	10/16	1550
	10/16	1145	10/16	1209

WELL DEVELOPMENT

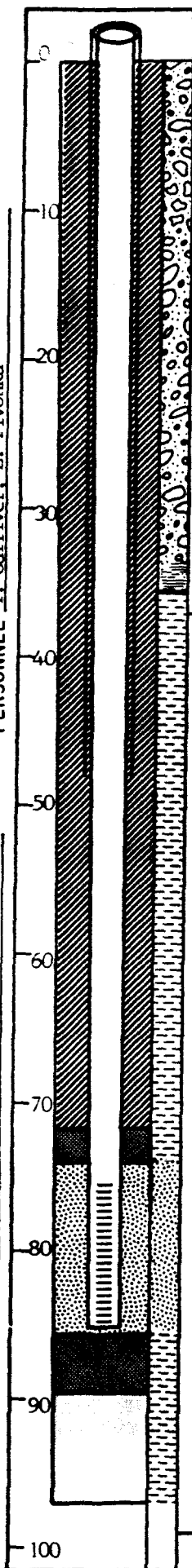
COMMENTS:

Water encountered at 32' during drilling.

Top of stainless steel casing: 1.64'

Cave from TD to 89.60'

Built well in NC rods, no centralizers used

LOCATION Golden, CO
PERSONNEL T. Gulliver, L. PivonkaPROJECT 106R06222
Rocky Flats Plant

FACKER TEST ANALYSIS

WELL NO. 54-86

ROCKY FLATS PLANT JOB NO. 106P06222

DATE TESTED: 10/10/86 BY: L. PIVONKA

TEST INTERVAL (FEET BELOW G.S.): 55.00 - 65.03

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 32.00

$$K = \frac{Q}{2(PI)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00027077 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 10.03 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 32.00 + 4.90 + 3.50 * 2.31 = 44.99

R = BOREHOLE RADIUS = .16 FEET

K = HYDRAULIC CONDUCTIVITY = .00000039 FT/MIN

K = .00000020 CM/SEC

PC/3 TEST

Q = INJECTION RATE = .00310032 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 10.03 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 32.00 + 4.90 + 11.00 * 2.31 = 62.31

R = BOREHOLE RADIUS = .16 FEET

K = HYDRAULIC CONDUCTIVITY = .00000026 FT/MIN

K = .00000166 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00046031 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 10.03 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 32.00 + 4.90 + 3.50 * 2.31 = 44.99

R = BOREHOLE RADIUS = .16 FEET

K = HYDRAULIC CONDUCTIVITY = .00000067 FT/MIN

K = .00000034 CM/SEC

PACKER TEST ANALYSIS

WELL NO. 54-86

ROCKY FLATS PLANT JOB NO. 106F06222

DATE TESTED: 10/10/86 BY: L. PIVONKA

TEST INTERVAL (FEET BELOW G.S.): 65.00 - 75.03

MATERIAL TESTED: ARAPAHOE CLAYSTONE

DEPTH TO WATER (FEET BELOW G.S.): 32.00

$$K = \frac{Q \cdot L}{2(P_1)(L)(H) \cdot \ln\left(\frac{L}{R}\right)}$$

1ST P1/3 TEST

Q = INJECTION RATE = .00010831 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 10.03 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 32.00 + 4.90 + 4.00 * 2.31 = 46.14

R = BOREHOLE RADIUS = .16 FEET

K = HYDRAULIC CONDUCTIVITY = .00000015 FT/MIN

K = .00000008 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00078523 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 10.03 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 32.00 + 4.90 + 13.00 * 2.31 = 66.93

R = BOREHOLE RADIUS = .16 FEET

K = HYDRAULIC CONDUCTIVITY = .00000077 FT/MIN

K = .00000039 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00008123 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 10.03 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 32.00 + 4.90 + 3.50 * 2.31 = 44.99

R = BOREHOLE RADIUS = .16 FEET

K = HYDRAULIC CONDUCTIVITY = .00000012 FT/MIN

K = .00000006 CM/SEC

PACKER TEST ANALYSIS

WELL NO. 54-B6

ROCKY FLATS PLANT JOB NO. 106P06222

DATE TESTED: 10/10/86 BY: L. PIVONKA

TEST INTERVAL (FEET BELOW G.S.): 73.00 - 83.03

MATERIAL TESTED: ARAFAHOE SANDSTONE

DEPTH TO WATER (FEET BELOW G.S.): 32.00

$$K = \frac{Q}{2(P_1)(L)(H)} \ln\left(\frac{L}{R}\right)$$

1ST P1/3 TEST

Q = INJECTION RATE = .00148924 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 10.03 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 32.00 + 4.90 + 4.00 * 2.31 = 46.14

R = BOREHOLE RADIUS = .16 FEET

K = HYDRAULIC CONDUCTIVITY = .00000211 FT/MIN

K = .00000107 CM/SEC

P2/3 TEST

Q = INJECTION RATE = .00415632 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 10.03 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 32.00 + 4.90 + 15.50 * 2.31 = 72.71

R = BOREHOLE RADIUS = .16 FEET

K = HYDRAULIC CONDUCTIVITY = .00000375 FT/MIN

K = .00000190 CM/SEC

2ND P1/3 TEST

Q = INJECTION RATE = .00066339 (FEET³/MIN)

L = LENGTH OF TEST INTERVAL = 10.03 FEET

TEST INTERVAL IS BELOW WATER TABLE

HEAD = DEPTH TO WATER + GAGE HEIGHT

+ GAGE PRESSURE (IN FEET)

= 32.00 + 4.90 + 3.50 * 2.31 = 44.99

R = BOREHOLE RADIUS = .16 FEET

K = HYDRAULIC CONDUCTIVITY = .00000097 FT/MIN

K = .00000049 CM/SEC

Page No. 98
12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
** Well Number: 5486			
07/07/86	39.75	6105.03	6065.28
10/24/86	45.25	6105.03	6059.78
10/27/86	60.16	6105.03	6044.87
10/29/86	76.60	6105.03	6028.43
11/03/86	57.87	6105.03	6047.16
11/04/86	73.19	6105.03	6031.84
11/12/86	75.56	6105.03	6029.47
11/14/86	71.44	6105.03	6033.59
11/17/86	67.09	6105.03	6037.94
11/18/86	75.28	6105.03	6029.75
11/25/86	73.70	6105.03	6031.33
01/01/87	40.17	6105.03	6064.86
05/08/87	41.04	6105.03	6063.99
06/02/87	55.38	6105.03	6049.65
07/13/87	38.30	6105.03	6066.73
08/03/87	48.70	6105.03	6056.33
08/10/87	42.10	6105.03	6062.93
09/29/87	40.00	6105.03	6065.03
11/02/87	40.70	6105.03	6064.33

INDEX OF DATA

Boring No.: 55-86

Completed as well? yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☒ Well Development Summaries
- ☒ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

LOG OF BORING NO. 55-86

Date Drilled 9/29/86

Coordinates N 32259.5 E 15217.2

Boring Method Casing Driver

Ground Surface Elevation 6103.62

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch)		Water Content (%)		Other Tests	
					20	40	20	40		
	20			26.0-27.0'-Cuttings. GRAVEL: moderate brown (5YR 4/4); granitic pebbles and cobbles with very fine-grained silty sand; poorly sorted; unconsolidated; damp.						
	25			27.0-32.0'-Cuttings. BOULDERS: granite and quartzite; damp.						
				32.0-33.0'-Cuttings. BOULDER: granitic; damp.						
	30			33.0-34.0'-Cuttings. SAND: pale yellowish brown (10YR 5/2) to pale brown (5YR 5/2); very fine-grained to very coarse-grained; silty; poorly sorted; rounded; damp.						
				34.0-35.5'-Cuttings. CLAY: moderate brown (10YR 4/4); sandy; very fine-grained; quartzite gravel at base; plastic; moist.						
	35			LARAMIE FORMATION	35.5-36.5'-Cuttings. CLAYSTONE: light olive gray (5Y 5/2) and dusky yellow (5Y 6/4); silty; plastic; moist.					
					TOTAL DEPTH: 36.5'					
	40									

Remarks

Logged by: T. Gulliver

Checked by:

Project No.

106P06222

Hydro-Search, Inc.

Page 2 of 2

WELL CONSTRUCTION SUMMARY

 LOCATION or COORDS: _____
 N 32259.5 E 15217.2

 ELEVATION: GROUND LEVEL 6103.62'
 TOP OF CASING 6105.81'

DRILLING SUMMARY:

 TOTAL DEPTH Well: 36.39' Hole: 36.50'
 BOREHOLE DIAMETER 5 5/8"

 DRILLER Boyles Brothers Drilling Co.
15865 W. 5th Avenue
Golden, CO (Arrow Drilling -
Tom High)

 RIG Casing advancer

 BIT(S) Down hole hammer

 DRILLING FLUID None

 SURFACE CASING 5" x 4.75' steel w/ locking
cap

WELL DESIGN:

 BASIS: GEOLOGIC LOG X GEOPHYSICAL LOG _____

CASING STRING(S): C=CASING S=SCREEN

0.00' 3.55' C1
3.55' - 36.39' S1

 CASING: C1 2" I.D. Sch 5 type 316 stain-
less steel, threaded and flush
jointed.

 SCREEN: S1 2" I.D. Sch. 5 type 316 stain-
less steel, threaded and flush
jointed. 0.010" wire wrap screen,
0.25' slip on bottom cap.

 CENTRALIZERS Type 304 stainless steel
23.81' - 25.04'

 FILTER MATERIAL 32-42 silica sand
2.48' - 36.50'

 CEMENT Portland Type I
0.00' - 1.80'

 OTHER 3/8" bentonite pellets
1.80' - 2.48'

CONSTRUCTION TIME LOG:

TASK	START		FINISH	
	DATE	TIME	DATE	TIME
DRILLING:	1986		1986	
	<u>9/29</u>	<u>1120</u>	<u>9/29</u>	<u>1440</u>
GEOPHYS. LOGGING:	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>
CASING:				
	<u>9/29</u>	<u>1705</u>	<u>9/29</u>	<u>1710</u>
FILTER PLACEMENT:	<u>9/29</u>	<u>1710</u>	<u>9/30</u>	<u>1100</u>
	<u>9/30</u>	<u>1105</u>	<u>9/30</u>	<u>1110</u>
	<u>10/2</u>	<u>1600</u>	<u>10/16</u>	<u>1600</u>
CEMENTING:				
LEVELPMENT:				
OTHER:				
	<u>9/30</u>	<u>1100</u>	<u>9/30</u>	<u>1105</u>

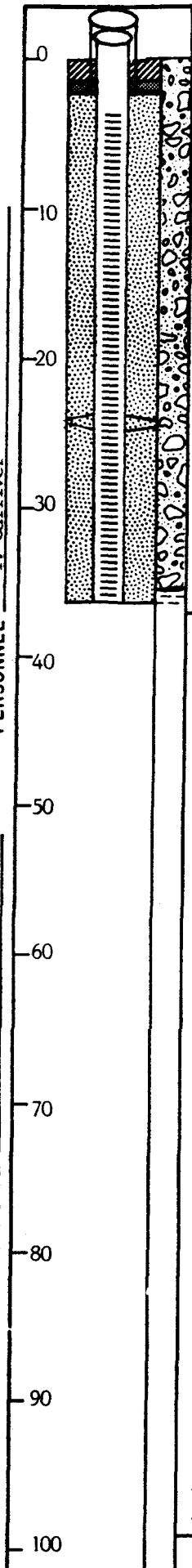
WELL DEVELOPMENT

See Well Development Summary Sheet.

COMMENTS:

No water encountered during drilling.
Top of stainless steel casing: 2.19'

 LOCATION Golden, CO
 PERSONNEL T. Gulliver

 PROJECT 106F06222
Rocky Flats Plant


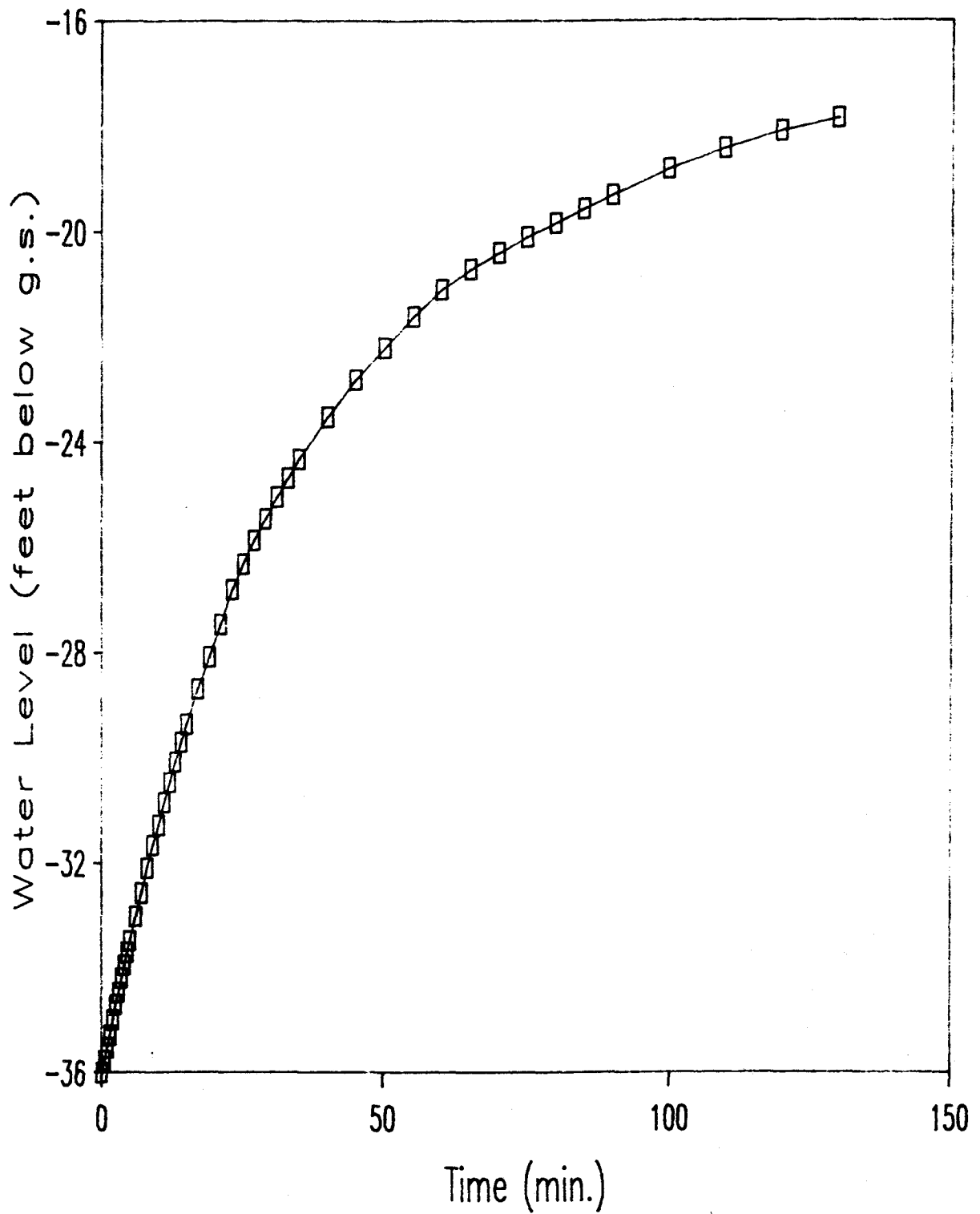
WELL DEVELOPMENT SUMMARY

WELL 55-86

DATE	TIME	METHOD	VOLUME	APPEARANCE	COMMENTS
10-2-86	1600	Airlifted			1 Well Bore Volume = 3.35 gals. 10 Well Bore Volumes = 33.5 gals.
10-3-86	1135	Bailed	6.5 gals.	Light-medium-dark brown	6.5/33.5 gals. purged to date
10-6-86	1500	Bailed	5.0 gals.	Light-medium brown	11.5/33.5 gals. purged to date
10-7-86	1350	Bailed	5.0 gals.	Light-medium reddish brown	16.5/33.5 gals. purged to date
10-8-86	1500	Bailed	5.0 gals.	Light - medium reddish-brown	21.5/33.5 gals. purged to date
10-9-86	1345	Bailed	5.0 gals.	Light-medium brown	26.5/33.5 gals. purged to date
10-9-86	1600	Bailed	5.0 gals.	Light-medium brown, clearing	31.5/33.5 gals. purged to date
10-10-86	0945	Bailed	5.0 gals.	Light-medium brown	36.5/33.5 gals. purged to date
10-10-86	1335	Bailed	5.0 gals.	Light brown, clearing	41.5/33.5 gals. purged to date
10-14-86	1115	Bailed	5.5 gals.	Medium to light brown	47/33.5 gals. purged to date
10-15-86	0930	Airlifted	—	Medium brown mist, sandy	—
10-15-86	1130	Bailed	5.0 gals.	Medium to light brown	52/33.5 gals. purged to date
10-15-86	1500	Bailed	5.0 gals.	Light brown to clear	57/33.5 gals. purged to date
10-16-86	1600	Bailed	—	Light brown to clear	Sampled

AQUIFER TEST DATA

WELL 55-86



AQUIFER TEST DATA

WELL 55-86

Type of Aquifer Test: Bail down - Recovery Project No.: 106P06222
 How & Measured: 4.5 gallon bucket Location: Rocky Flats Plant
 How W.L.'s Measured: Olympic Well Sounder Personnel: D. Pavlick, M. Bergman
 Measuring Point for W.L.'s: Top of Casing
 Elevation of Measuring Point: 6115.2

Depth of pump/airline: N/A

Start bailing: 10/21/86 Time: 13:46:00

Stop bailing: 10/21/86 Time: 14:00:00

Duration of Aquifer Test: 134 minutes

TIME		WATER LEVEL DATA		COMMENTS
t = 4.0 min.	at t' = 0	Static Water Level:	15.96'	
t	t'	Water Level	Draw-down	
0				Begin bailing
4.0	0	36.00	20.04	Stop bailing
4.5	.5	35.77	19.81	Bailed 5 gallons
5.0	1.0	35.53	19.57	
5.5	1.5	35.29	19.33	
6.0	2.0	35.00	19.04	
6.5	2.5	34.71	18.75	
7.0	3.0	34.48	18.52	
7.5	3.5	34.20	18.24	
8.0	4.0	33.95	17.99	
8.5	4.5	33.71	17.75	
9.0	5.0	33.49	17.53	
10.0	6.0	33.02	17.06	
11.0	7.0	32.57	16.61	
12.0	8.0	32.10	16.14	
13.0	9.0	31.67	15.71	
14.0	10.0	31.29	15.33	
15.0	11.0	30.86	14.90	
16.0	12.0	30.48	14.52	
17.0	13.0	30.09	14.13	
18.0	14.0	29.71	13.75	
19.0	15.0	29.37	13.41	
21.0	17.0	28.70	12.74	
23.0	19.0	28.09	12.13	
25.0	21.0	27.47	11.51	
27.5	23.0	26.80	10.84	
29.0	25.0	26.32	10.36	
31.0	27.0	25.87	9.91	
33.0	29.0	25.46	9.50	
35.0	31.0	25.05	9.09	
37.0	33.0	24.69	8.73	
39.0	35.0	24.33	8.37	
44.0	40.0	23.53	7.57	
49.0	45.0	22.82	6.86	

54.0	50.0	22.21	6.25
59.0	55.0	21.61	5.65
64.0	60.0	21.10	5.14
69.0	65.0	20.71	4.75
74.0	70.0	20.40	4.44
79.0	75.0	20.10	4.14
84.0	80.0	19.84	3.88
89.0	85.0	19.57	3.61
94.0	90.0	19.31	3.35
104.0	100.0	18.82	2.86
114.0	110.0	18.43	2.47
124.0	120.0	18.10	2.14
134.0	130.0	17.86	1.90

90% Recovered at
20.16'

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
** Well Number: 5586			
10/02/86	17.95	6105.81	6087.86
10/03/86	18.08	6105.81	6087.73
10/06/86	18.41	6105.81	6087.40
10/07/86	18.34	6105.81	6087.47
10/08/86	18.41	6105.81	6087.40
10/09/86	18.56	6105.81	6087.25
10/10/86	19.50	6105.81	6086.31
10/13/86	18.33	6105.81	6087.48
10/16/86	18.37	6105.81	6087.44
11/26/86	18.63	6105.81	6087.18
01/01/87	18.60	6105.81	6087.21
05/11/87	7.15	6105.81	6098.66
06/02/87	8.90	6105.81	6096.91
07/08/87	10.05	6105.81	6095.76
07/13/87	11.00	6105.81	6094.81
08/03/87	7.20	6105.81	6098.61
08/10/87	12.90	6105.81	6092.91
09/29/87	15.60	6105.81	6090.21
11/02/87	16.00	6105.81	6089.81

INDEX OF DATA

Boring No.: 56-86

Completed as well? yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☒ Well Development Summaries
- ☒ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

Project: Rocky Flats Plant



LOG OF BORING NO. 56-86

Date Drilled 9/26/86


Coordinates N 34071.9 E 17104.2

Boring Method Casing Driver

Ground Surface Elevation 5977.16

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	0			ROCKY FLATS ALLUVIUM 0-7.0'-Cuttings. BOULDERS: granite and quartzite; <1% sand; dry.					
	5			7.0-9.0'-Cuttings. SILT: moderate brown (5YR 3/4); clayey; sandy; poorly sorted; unconsolidated; non-plastic; moist.					
	10			LARAMIE FORMATION 9.0-10.0'-Cuttings. CLAYSTONE: light olive gray (5Y 5/2) to moderate brown (5YR 4/4); plastic; moist. 10.0-17.0'-Cuttings. SILTSTONE: light olive gray (5Y 5/2) to moderate brown (5YR 4/4); well sorted; dry.					
	15								
	20			TOTAL DEPTH: 17.0'					

Remarks Logged by: T. Gulliver

Checked by: 

Project No.
106P06222

Hydro-Search, Inc.

Page 1 of 1

WELL CONSTRUCTION SUMMARY

LOCATION or COORDS: N 34071.9 E 17104.2

ELEVATION: GROUND LEVEL 5977.16'
TOP OF CASING 5979.15'

DRILLING SUMMARY:

TOTAL DEPTH Well: 9.60' Hole: 17.00'
BOREHOLE DIAMETER 5 5/8"

DRILLER Boyles Brothers Drilling Co.
15865 W. 5th Avenue, Golden, CO
Arrow Drilling, Tom High)

RIG Failing 1500

BIT(S) Down hole hammer

DRILLING FLUID None

SURFACE CASING 5" x 3.81' steel w/ locking cap

WELL DESIGN:

BASIS: GEOLOGIC LOG X GEOPHYSICAL LOG

CASING STRING(S): C= CASING S=SCREEN

0.00' 2.60' C1 | -

2.60'	9.60'	SI			
-------	-------	----	--	--	--

Case No.	Case Name	Case Address	Case City	Case State	Case Zip	Case Phone	Case Fax	Case Email	Case Website	Case Notes
1	Case 1 Name	Case 1 Address	Case 1 City	Case 1 State	Case 1 Zip	Case 1 Phone	Case 1 Fax	Case 1 Email	Case 1 Website	Case 1 Notes
2	Case 2 Name	Case 2 Address	Case 2 City	Case 2 State	Case 2 Zip	Case 2 Phone	Case 2 Fax	Case 2 Email	Case 2 Website	Case 2 Notes
3	Case 3 Name	Case 3 Address	Case 3 City	Case 3 State	Case 3 Zip	Case 3 Phone	Case 3 Fax	Case 3 Email	Case 3 Website	Case 3 Notes
4	Case 4 Name	Case 4 Address	Case 4 City	Case 4 State	Case 4 Zip	Case 4 Phone	Case 4 Fax	Case 4 Email	Case 4 Website	Case 4 Notes
5	Case 5 Name	Case 5 Address	Case 5 City	Case 5 State	Case 5 Zip	Case 5 Phone	Case 5 Fax	Case 5 Email	Case 5 Website	Case 5 Notes
6	Case 6 Name	Case 6 Address	Case 6 City	Case 6 State	Case 6 Zip	Case 6 Phone	Case 6 Fax	Case 6 Email	Case 6 Website	Case 6 Notes
7	Case 7 Name	Case 7 Address	Case 7 City	Case 7 State	Case 7 Zip	Case 7 Phone	Case 7 Fax	Case 7 Email	Case 7 Website	Case 7 Notes
8	Case 8 Name	Case 8 Address	Case 8 City	Case 8 State	Case 8 Zip	Case 8 Phone	Case 8 Fax	Case 8 Email	Case 8 Website	Case 8 Notes
9	Case 9 Name	Case 9 Address	Case 9 City	Case 9 State	Case 9 Zip	Case 9 Phone	Case 9 Fax	Case 9 Email	Case 9 Website	Case 9 Notes
10	Case 10 Name	Case 10 Address	Case 10 City	Case 10 State	Case 10 Zip	Case 10 Phone	Case 10 Fax	Case 10 Email	Case 10 Website	Case 10 Notes
11	Case 11 Name	Case 11 Address	Case 11 City	Case 11 State	Case 11 Zip	Case 11 Phone	Case 11 Fax	Case 11 Email	Case 11 Website	Case 11 Notes
12	Case 12 Name	Case 12 Address	Case 12 City	Case 12 State	Case 12 Zip	Case 12 Phone	Case 12 Fax	Case 12 Email	Case 12 Website	Case 12 Notes
13	Case 13 Name	Case 13 Address	Case 13 City	Case 13 State	Case 13 Zip	Case 13 Phone	Case 13 Fax	Case 13 Email	Case 13 Website	Case 13 Notes
14	Case 14 Name	Case 14 Address	Case 14 City	Case 14 State	Case 14 Zip	Case 14 Phone	Case 14 Fax	Case 14 Email	Case 14 Website	Case 14 Notes
15	Case 15 Name	Case 15 Address	Case 15 City	Case 15 State	Case 15 Zip	Case 15 Phone	Case 15 Fax	Case 15 Email	Case 15 Website	Case 15 Notes
16	Case 16 Name	Case 16 Address	Case 16 City	Case 16 State	Case 16 Zip	Case 16 Phone	Case 16 Fax	Case 16 Email	Case 16 Website	Case 16 Notes
17	Case 17 Name	Case 17 Address	Case 17 City	Case 17 State	Case 17 Zip	Case 17 Phone	Case 17 Fax	Case 17 Email	Case 17 Website	Case 17 Notes
18	Case 18 Name	Case 18 Address	Case 18 City	Case 18 State	Case 18 Zip	Case 18 Phone	Case 18 Fax	Case 18 Email	Case 18 Website	Case 18 Notes
19	Case 19 Name	Case 19 Address	Case 19 City	Case 19 State	Case 19 Zip	Case 19 Phone	Case 19 Fax	Case 19 Email	Case 19 Website	Case 19 Notes
20	Case 20 Name	Case 20 Address	Case 20 City	Case 20 State	Case 20 Zip	Case 20 Phone	Case 20 Fax	Case 20 Email	Case 20 Website	Case 20 Notes
21	Case 21 Name	Case 21 Address	Case 21 City	Case 21 State	Case 21 Zip	Case 21 Phone	Case 21 Fax	Case 21 Email	Case 21 Website	Case 21 Notes
22	Case 22 Name	Case 22 Address	Case 22 City	Case 22 State	Case 22 Zip	Case 22 Phone	Case 22 Fax	Case 22 Email	Case 22 Website	Case 22 Notes
23	Case 23 Name	Case 23 Address	Case 23 City	Case 23 State	Case 23 Zip	Case 23 Phone	Case 23 Fax	Case 23 Email	Case 23 Website	Case 23 Notes
24	Case 24 Name	Case 24 Address	Case 24 City	Case 24 State	Case 24 Zip	Case 24 Phone	Case 24 Fax	Case 24 Email	Case 24 Website	Case 24 Notes
25	Case 25 Name	Case 25 Address	Case 25 City	Case 25 State	Case 25 Zip	Case 25 Phone	Case 25 Fax	Case 25 Email	Case 25 Website	Case 25 Notes
26	Case 26 Name	Case 26 Address	Case 26 City	Case 26 State	Case 26 Zip	Case 26 Phone	Case 26 Fax	Case 26 Email	Case 26 Website	Case 26 Notes
27	Case 27 Name	Case 27 Address	Case 27 City	Case 27 State	Case 27 Zip	Case 27 Phone	Case 27 Fax	Case 27 Email	Case 27 Website	Case 27 Notes
28	Case 28 Name	Case 28 Address	Case 28 City	Case 28 State	Case 28 Zip	Case 28 Phone	Case 28 Fax	Case 28 Email	Case 28 Website	Case 28 Notes
29	Case 29 Name	Case 29 Address	Case 29 City	Case 29 State	Case 29 Zip	Case 29 Phone	Case 29 Fax	Case 29 Email	Case 29 Website	Case 29 Notes
30	Case 30 Name	Case 30 Address	Case 30 City	Case 30 State	Case 30 Zip	Case 30 Phone	Case 30 Fax	Case 30 Email	Case 30 Website	Case 30 Notes
31	Case 31 Name	Case 31 Address	Case 31 City	Case 31 State	Case 31 Zip	Case 31 Phone	Case 31 Fax	Case 31 Email	Case 31 Website	Case 31 Notes
32	Case 32 Name	Case 32 Address	Case 32 City	Case 32 State	Case 32 Zip	Case 32 Phone	Case 32 Fax	Case 32 Email	Case 32 Website	Case 32 Notes
33	Case 33 Name	Case 33 Address	Case 33 City	Case 33 State	Case 33 Zip	Case 33 Phone	Case 33 Fax			

CASING: C1 2" I.D. Sch. 5 type 316 stain-
less steel, threaded and flush
jointed.

SCREEN: SI 2" I.D. Sch. 5 type 316 stain-
less steel, threaded and flush
jointed, 0.010" wire wrap screen
0.25' welded bottom cap.

CENTRALIZERS Type 304 stainless steel
6.33' - 7.55'

FILTER MATERIAL 32-42 silica sand
2.45' - 10.00'

CEMENT Portland Type I
0.00' - 2.30'

OTHER 3/8" bentonite pellets
2.30' - 2.45'

10.00' - 17.00'

CONSTRUCTION TIME LOG:

<u>TASK</u>	<u>START</u>	<u>FINISH</u>
	<u>DATE</u> 1986	<u>TIME</u> 1986
DRILLING:		
<u>5 5/8" casing</u>	<u>9/26</u>	<u>0815</u>
<u>advancer</u>		
GEOPHYS. LOGGING:	<u>—</u>	<u>—</u>
CASING:		
<u>2" stainless</u>	<u>9/26</u>	<u>1500</u>
FILTER PLACEMENT:	<u>9/26</u>	<u>1505</u>
CEMENTING:	<u>9/26</u>	<u>1535</u>
DEVELOPMENT:	<u>9/30</u>	<u>1330</u>
OTHER:		
<u>Bentonite</u>	<u>9/26</u>	<u>1445</u>
	<u>9/26</u>	<u>1530</u>

WELL DEVELOPMENT

See Well Development Summary Sheet.

COMMENTS:

Water encountered at 7.0' during drilling.

Top of stainless steel casing: 1.99'

First well construction attempt failed. Screen pulled, hole washed, and well rebuilt.

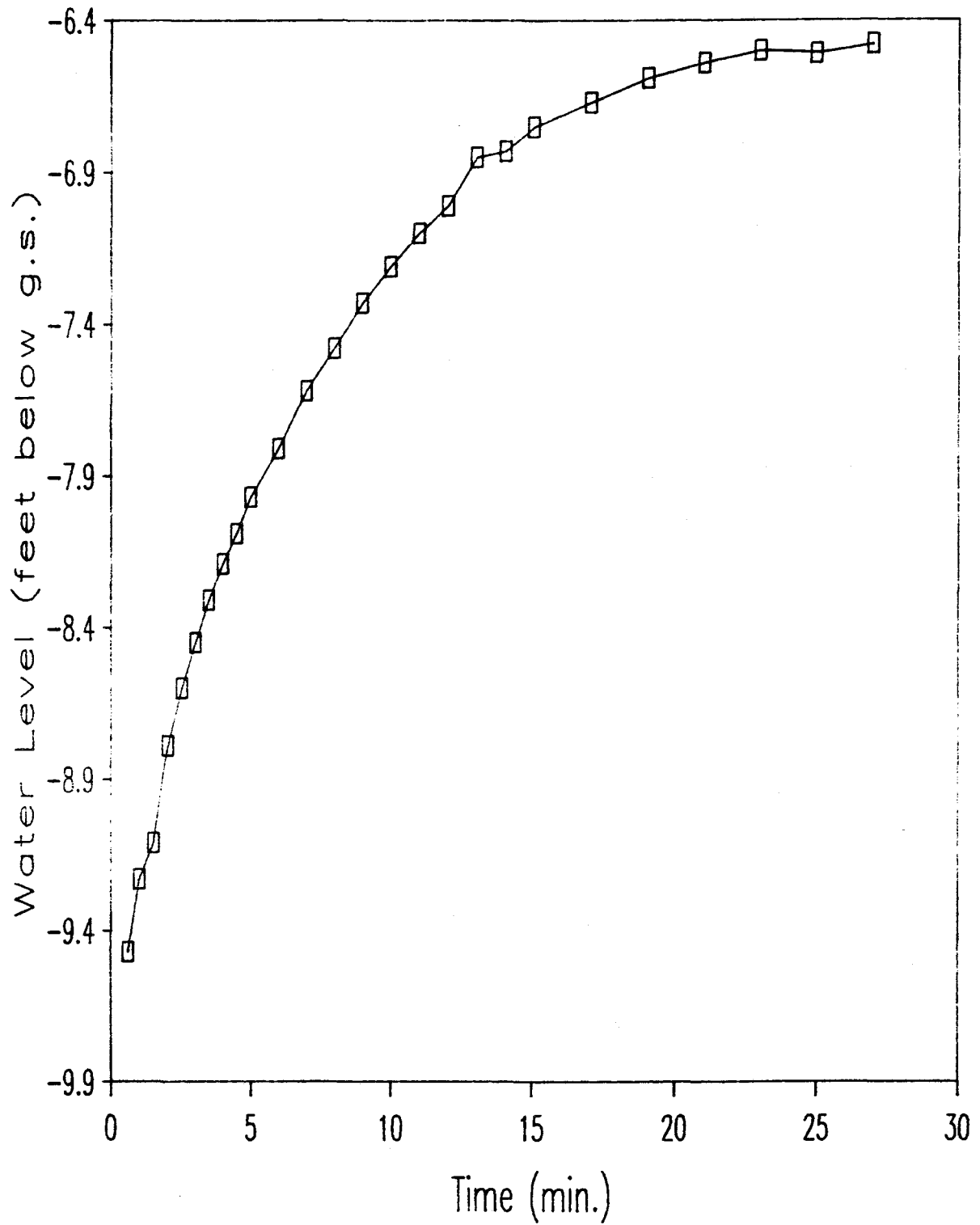
WELL 56-86

Hydro-Search, Inc. Reno • Denver

CONSULTING HYDROLOGISTS-GEOLOGISTS

AQUIFER TEST DATA

WELL 56-86



AQUIFER TEST DATA

WELL 56-86

Type of Aquifer Test: Bail down - Recovery Project No.: 106P06222
 How Q Measured: 4.5 gallon bucket Location: Rocky Flats Plant
 How W.L.'s Measured: Olympic Well Sounder Personnel: W.Herst, M. Bergman
 Measuring Point for W.L.'s: Top of Casing
 Elevation of Measuring Point: 5987.74

Depth of pump/airline: N/A

Start bailing: 10/01/86 Time: 1140:00

Stop bailing: 10/01/86 Time: 1153:00

Duration of Aquifer Test: 40 minutes

TIME		WATER LEVEL DATA		COMMENTS
t = 13	at t' = 0	Static Water Level: 6.16		
t	t'	Water Level	Draw-down	
0				
13.0	0			Total Depth = 9.38'
13.6	.6	9.47	3.31	
14.0	1.0	9.23	3.07	
14.5	1.5	9.11	2.95	
15.0	2.0	8.79	2.63	
15.5	2.5	8.60	2.44	
16.0	3.0	8.45	2.29	
16.5	3.5	8.31	2.15	
17.0	4.0	8.19	2.03	
17.5	4.5	8.09	1.93	
18.0	5.0	7.97	1.81	
19.0	6.0	7.81	1.65	
20.0	7.0	7.62	1.46	
21.0	8.0	7.48	1.32	
22.0	9.0	7.33	1.17	
23.0	10.0	7.21	1.05	
24.0	11.0	7.10	.94	
25.0	12.0	7.01	.85	
26.0	13.0	6.85	.69	
27.0	14.0	6.83	.67	
28.0	15.0	6.75	.59	
30.0	17.0	6.67	.51	
32.0	19.0	6.59	.43	
34.0	21.0	6.54	.38	
36.0	23.0	6.50	.34	
38.0	25.0	6.51	.35	
40.0	27.0	6.48	.32	90% recovered at 6.48'

Page No. 100
12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
--------------------------	------------------------------------	-------------------------------	-----------------------------------

** Well Number: 5686

09/30/86	8.01	5979.15	5971.14
10/01/86	8.03	5979.15	5971.12
10/02/86	7.97	5979.15	5971.18
10/13/86	6.33	5979.15	5972.82
11/26/86	6.69	5979.15	5972.46
01/01/87	6.83	5979.15	5972.32
05/08/87	5.02	5979.15	5974.13
06/02/87	6.61	5979.15	5972.54
07/07/87	6.73	5979.15	5972.42
07/14/87	6.80	5979.15	5972.35
08/03/87	7.50	5979.15	5971.65
09/29/87	34.40	5979.15	5944.75
11/09/87	6.90	5979.15	5972.25

INDEX OF DATA

Boring No.: 62-86

Completed as well? Yes

Data in File

- X Log of Borehole
- X Well Construction Summaries
- X Well Development Summaries
- X Hydraulic Conductivity Test Data
and Results
- Packer Test Data and Results
- X Water Level Data

Project: Rocky Flats Plant

LOG OF BORING NO. 62-86

Date Drilled 9/25/86

Coordinates N 35154.3 E 22613.2

Boring Method Hollow Stem Auger

Ground Surface Elevation 5897.54

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch)		Water Content (%)		Other Tests
					20	40	20	40	
	0			COLLUVIUM					
				0-0.5'-Sample. Recovered 0.5/0.5'=100%. CLAY: dusky yellowish brown (10YR 2/2); silty; some granitic pebbles and small cobbles; poorly sorted; unconsolidated; dry.					
				0.5-4.8'-Sample. Recovered 3.7/4.3'=86%. CLAY: dusky yellowish brown (10YR 2/2) and moderate yellowish brown (10YR 5/4); silty; trace of small granitic cobbles; poorly sorted; consolidated; damp.					
	5			4.8-7.5'-Sample. Recovered 1.6/2.7'=59%. CLAY: Same as above; damp.					
				7.5-10.5'-Sample. Recovered 3.0/3.0'=100%. CLAY: Same as above; moist.					
				10.5-12.7'-Sample. Recovered 1.3/2.2'=59%. CLAY: Same as above; moist.					
	10			12.7-14.0'-Sample. Recovered 0.6/1.3'=46%. GRAVEL: moderate brown (5YR 4/4); granitic pebbles and cobbles; some clay and sand; poorly sorted; unconsolidated; wet.					
				14.0-14.5'-Sample. Recovered 0.5/0.5'=100%. CLAY: light olive gray (5Y 6/1); mottled iron staining; unconsolidated; moist.					
	15			14.5-17.8'-Sample. Recovered 1.6/3.3'=48%. CLAY: moderate brown (5YR 4/4); silty; trace of small granitic cobbles; poorly sorted; unconsolidated; moist.					
				17.8-20.3'-Sample. Recovered 1.0/2.5'=40%. GRAVEL: moderate brown (5YR 4/4); granitic pebbles and cobbles, some sand and micaceous clay; poorly sorted; unconsolidated; wet.					
	20								

Remarks

Logged by: L. Pivonka

Checked by: 

Project No.

106P06222

Hydro-Search, Inc.

Page 1 of 3

Project: Rocky Flats Plant

LOG OF BORING NO. 62-86

Date Drilled 9/25/86

Coordinates N 35154.3 E 22613.2

Boring Method Hollow Stem Auger

Ground Surface Elevation 5897.54

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch)		Water Content (%)		Other Tests
					20	40	20	40	
	20			20.3-22.0'-Sample. Recovered 0.9/1.7'=53%. GRAVEL: Same as above; wet.					
				ARAPAHOE FORMATION					
				22.0-22.8'-Sample. Recovered 0.3/0.8'=38%. CLAYSTONE: light olive gray (5Y 6/1) and dark yellowish orange (10YR 6/6); weathered; consolidated; moist.					
	25			22.8-25.3'-Sample. Recovered 2.0/2.5'=80%. CLAYSTONE: Same as above; moist.					
				25.3-27.8'-Sample. Recovered 1.5/2.5'=60%. SANDSTONE: light olive gray (5Y 6/1) and dark yellowish orange (10YR 6/6); weathered; well sorted; moderately well cemented; moist.					
	30			27.8-30.3'-Sample. Recovered 2.5/2.5'=100%. SANDSTONE: Same as above; moist.					
				30.3-32.8'-Sample. Recovered 2.5/2.5'=100%. SANDSTONE: Same as above; moist.					
				32.4-34.5'-Sample. Recovered 2.3/2.3'=100%. SANDSTONE: Same as above; moist.					
	35			34.5-35.4'-Sample. Recovered 0.9/0.9'=100%. CLAYSTONE: medium gray (N 5) and dark yellowish orange (10YR 6/6); some fine-grained sand; weathered; consolidated; damp.					
				35.4-37.9'-Sample. Recovered 2.5/2.5'=100%. CLAYSTONE: Same as above; damp.					
	40			37.9-40.4'-Sample. Recovered 2.0/2.5'=80%. CLAYSTONE: Same as above; damp.					

Remarks

Logged by: L. Pivonka

Checked by: 

Project No.

106P06222

Hydro-Search, Inc.

Page 2 of 3

Project: Rocky Flats Plant

LOG OF BORING NO. 62-86

Date Drilled 9/25/86

Coordinates N 35154.3 E 22613.2

Boring Method Hollow Stem Auger

Ground Surface Elevation 5897.54

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	40			40.4-42.9'-Sample. Recovered 2.5/2.5'=100%. SANDSTONE: medium gray (N 5); some iron staining; plant fossils; well sorted; weathered; consolidated; damp.					
				42.9-45.4'-Sample. Recovered 2.5/2.5'=100%. SANDSTONE: Same as above; damp.					
	45			45.4-47.9'-Sample. Recovered 2.5/2.5'=100%. SANDSTONE: medium gray (N 5) and dark yellowish orange (10YR 6/6); some iron staining; plant fossils; interbedded claystone beds "1.0" thick; weathered; well sorted; consolidated; damp.					
				47.9-50.0'-Sample. Recovered 2.1/2.1'=100%. CLAYSTONE: medium gray (N 5) and dark yellowish orange (10YR 6/6); sandy; iron staining; plant fossils; weathered; consolidated; damp.					
	50			50.0-52.8'-Sample. Recovered 2.8/2.8'=100%. SANDSTONE: olive gray (5Y 4/1); fine to medium-grained; clayey; mottled iron staining; well sorted; consolidated; moist.					
				52.8-55.3'-Sample. Recovered 2.5/2.5'=100%. SANDSTONE: olive gray (5Y 4/1); medium-grained sand; clay laminae; well sorted; consolidated; moist to wet.					
	55			55.3-57.8'-Sample. Recovered 2.0/2.5'=80%. SANDSTONE: Same as above; wet.					
				57.8-59.3'-Sample. Recovered 1.5/1.5'=100%. SANDSTONE: Same as above; wet.					
	60			TOTAL DEPTH: 59.5'					

Remarks Logged by: L. Pivonka

Checked by: *[Signature]*

Project No.
106P06222

Hydro-Search, Inc.

Page 3 of 3

WELL DEVELOPMENT SUMMARY

WELL 62-86

DATE	TIME	METHOD	VOLUME	APPEARANCE	COMMENTS
10-6-86	1610				1 Well Bore Volume = 1.4 gals. 10 Well Bore Volumes = 14.4 gals.
10-6-86	1610	Airlifted	1.4 gals.	Light brown mist	None
10-7-86	1530	Bailed	1.8 gals.	Light brown, slightly turbid	1.8/14.4 gals. purged to date
10-8-86	1425	Bailed	2.0 gals.	Very light brown, slightly turbid	3.8/14.4 gals. purged to date
10-9-86	1230	Bailed	2.0 gals.	Light to very light brown	5.8/14.4 gals. purged to date
10-9-86	1700	Bailed	1.5 gals.	Light brown to clear	7.3/14.4 gals. purged to date
10-10-86	0835	Bailed	2.0 gals.	Clear	9.3/14.4 gals. purged to date
10-10-86	1100	Bailed	1.5 gals.	Clear, slightly turbid	10.8/14.4 gals. purged to date
10-10-86	1540	Bailed	2.0 gals.	Clear, slightly turbid	12.8/14.4 gals purged to date
10-14-86	1045	Bailed	2.0 gals.	Clear, slightly turbid	14.8/14.4 gals. purged to date
10-15-86	1040	Bailed	2.0 gals.	Clear, slightly turbid	16.8/14.4 gals. purged to date
10-16-86	0940	Bailed	—	Clear, slightly turbid	Sampled

PROGRAM SLUGT, VERSION 4, OCT. 1985

THIS PROGRAM CALCULATES MEAN TRANSMISSIVITIES FROM SLUG-TEST DATA BASED ON TWO ANALYTICAL APPROACHES:

- (1) METHOD OF COOPER, BREDEHDEFT AND PAPADOPULOS, 1967 (ARTICLE IN VOL.3, NO.1 OF WRR ENTITLED "RESPONSE OF A FINITE DIAMETER WELL TO AN INSTANTANEOUS CHARGE OF WATER")
- (2) METHOD OF BOUWER AND RICE, 1976 (ARTICLE IN VOL. 12, NO.3 OF WRR ENTITLED "A SLUG TEST FOR DETERMINING HYDRAULIC CONDUCTIVITY OF UNCONFINED AQUIFERS WITH COMPLETELY OR PARTIALLY PENETRATING WELLS")

PROJECT NO.: 6-0118-87

CLIENT: Rockwell International

ITE LOCATION: Rocky Flats Plant

DATE OF SLUG TEST: 10-15-87

FIELD INVESTIGATOR: Kevin McNeill

WELL NO.: 62-86

INPUT DATA ARE:

INNER CASING DIAMETER = 2.00 INCHES

LENGTH OF SCREEN OR INTAKE PORTION = 9.97 FEET

INNER SCREEN OR OPEN-HOLE DIAMETER = 2.00 INCHES

DEPTH FROM STATIC LEVEL TO BOTTOM OF SCREEN = 10.92 FEET

DIAMETER OF DRILLED HOLE = 7.25 INCHES

THICKNESS OF SATURATED AQUIFER ZONE = 10.23 FEET

ESTIMATED POROSITY OF GRAVEL PACK = .25

FALLING-HEAD INDEX = 0 ("1" IF FALLING, "0" IF RISING)

NUMBER OF HEAD-TIME DATA POINTS = 42

TIME (sec)	HEAD (FEET)
1.00	.840
2.00	.840
3.00	.840
4.00	.830
5.00	.830
6.00	.830
7.00	.830
8.00	.830
9.00	.820
10.00	.820
11.00	.820
12.00	.820
13.00	.820
14.00	.820
15.00	.810
16.00	.810
17.00	.810
18.00	.810
19.00	.810
20.00	.810
52.00	.800
82.00	.790
112.00	.780
172.00	.770
232.00	.750
292.00	.740
352.00	.730
412.00	.720
472.00	.710
532.00	.700
652.00	.690
772.00	.670
892.00	.660
1042.00	.640
1222.00	.620
1402.00	.600
1582.00	.590
1762.00	.570
1942.00	.560
2122.00	.550
2302.00	.540
2542.00	.520

HO WAS COMPUTED FROM INTERCEPT OF PLOT OF LOG(H) VS. TIME

SUCCESSIVE COMPUTED
VALUES FOR HO
(FEET)

.8101
.8112

METHOD OF BOUWER AND RICE

COMPUTED RESULTS USING DIAMETER OF DRILLED HOLE:

PERMEABILITY = $1.88\text{E-}07$ FT/sec = $5.73\text{E-}06$ CM/sec

TRANSMISSIVITY = $1.92\text{E-}06$ FT²/sec

COMPUTED RESULTS USING DIAMETER OF CASING AND SCREEN:

PERMEABILITY = $2.64\text{E-}07$ FT/sec = $8.03\text{E-}06$ CM/sec

TRANSMISSIVITY = $2.70\text{E-}06$ FT²/sec

12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
** Well Number: 6286			
10/06/86	27.90	5898.75	5870.85
10/07/86	27.91	5898.75	5870.84
10/08/86	27.98	5898.75	5870.77
10/10/86	28.00	5898.75	5870.75
10/13/86	27.83	5898.75	5870.92
10/14/86	27.89	5898.75	5870.86
10/15/86	28.03	5898.75	5870.72
10/16/86	27.99	5898.75	5870.76
11/26/86	27.92	5898.75	5870.83
01/01/87	27.96	5898.75	5870.79
05/07/87	27.83	5898.75	5870.92
06/02/87	27.10	5898.75	5871.65
06/24/87	27.16	5898.75	5871.59
07/06/87	26.50	5898.75	5872.25
08/06/87	26.00	5898.75	5872.75
09/02/87	25.80	5898.75	5872.95
10/05/87	25.70	5898.75	5873.05
12/01/87	25.90	5898.75	5872.85

INDEX OF DATA

Boring No.: 63-86

Completed as well? Yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☒ Well Development Summaries
- ☐ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

Project: Rocky Flats Plant

LOG OF BORING NO. 63-86

Date Drilled 9/26/86

Coordinates N 35156.0 E 22641.5

Boring Method Hollow Stem Auger

Ground Surface Elevation 5896.55

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	0			COLLOVIUM					
				0-0.5'-Sample. Recovered 0.5/0.5'=100%. CLAY: dusky yellowish brown (10YR 2/2); silty; some small granitic cobbles; poorly sorted; unconsolidated; damp.					
				0.5-3.8'-Sample. Recovered 0.4/3.3'=12%. CLAY: dark yellowish orange (10YR 6/6); silty; trace granitic pebbles; poorly sorted; unconsolidated; damp.					
	5			3.8-5.8'-Sample. Recovered 1.0/2.0'=50%. CLAY: Same as above; damp.					
				5.8-7.3'-Sample. Recovered 1.5/1.5'=100%. CLAY: Same as above; moist.					
				7.3-9.8'-Sample. Recovered 1.2/2.5'=48%. CLAY: Same as above; moist.					
	10			9.8-12.3'-Sample. Recovered 2.0/2.5'=80%. CLAY: Same as above; moist.					
				12.3-14.2'-Sample. Recovered 1.5/2.0'=80%. CLAY: Same as above; moist.					
				14.8-17.3'-Sample. Recovered 2.5/2.5'=100%.					
	15			14.4-14.8'. GRAVEL: moderate yellowish brown (10YR 5/4) and grayish orange (10YR 7/4); granitic pebbles and cobbles; sandy; poorly sorted; unconsolidated; moist to wet.					
				ARAPAHOE FORMATION					
				14.8-17.3'. CLAYSTONE: light olive gray (5Y 6/1); mottled iron staining; consolidated; moist.					
	20			TOTAL DEPTH: 17.3'					

Remarks

Logged by: L. Pivonka

Checked by: 

Project No.

106P06222

Hydro-Search, Inc.

Page 1 of 1

WELL CONSTRUCTION SUMMARY

 LOCATION or COORDS: _____
 N 35156.0 E 22641.5

 ELEVATION: GROUND LEVEL 5896.55'
 TOP OF CASING 5897.48'

DRILLING SUMMARY:

TOTAL DEPTH Well: 15.50' Hole: 17.30'

BOREHOLE DIAMETER 7 1/4"

DRILLER Boyles Brothers Drilling Co.

15865 W. 5th Avenue

Golden, CO (Jim Horn)

RIG Mobile B-57

BIT(S) Blade bit

DRILLING FLUID None

SURFACE CASING 5" x 4' steel w/ locking cap

WELL DESIGN:

BASIS: GEOLOGIC LOG ☒ GEOPHYSICAL LOG _____

CASING STRING(S): C=CASING S=SCREEN

0.00' - 3.80' C1 _____

3.80' - 15.25' S1 _____

CASING: C1 2" I.D. Sch. 5 type 316 stainless steel, threaded and flush jointed.

SCREEN: S1 2" I.D. Sch. 5 type 316 stainless steel, threaded and flush jointed, 0.010" wire wrap screen, 0.25' welded bottom cap.

CENTRALIZERS Type 304 stainless steel
8.93' - 10.15'FILTER MATERIAL 32-42 silica sand
3.00' - 15.80'CEMENT Portland Type I
0.00' - 2.00'OTHER 3/8" bentonite pellets
2.00' - 3.00'
15.80' - 17.30'

CONSTRUCTION TIME LOG:

TASK	START		FINISH	
	DATE 1986	TIME	DATE 1986	TIME
DRILLING:				
7 1/4" auger	9/26	1630	9/29	1205
GEOPHYS. LOGGING:	—	—	—	—
CASING:				
2" stainless	9/29	1221	9/29	1223
FILTER PLACEMENT:	9/29	1223	9/29	1235
CEMENTING:	9/29	1237	9/29	1240
DEVELOPMENT:	10/6	1610	10/6	1610
OTHER:				
Bentonite	9/29	1220	9/29	1221
	9/29	1235	9/29	1237

WELL DEVELOPMENT

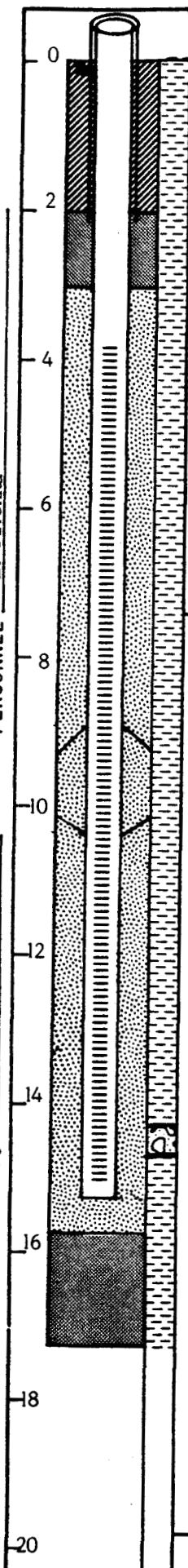
See Well Development Summary Sheet.

COMMENTS:

Water encountered at 14' during drilling.

Top of stainless steel casing: 0.93'

 LOCATION Golden, CO
 PERSONNEL L. Pivonka

 PROJECT 106P06222
 Rocky Flats Plant


WELL

63-86

Dry

12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
** Well Number: 6386			
10/06/86	-1.00	5897.48	
10/13/86	-1.00	5897.48	
11/26/86	-1.00	5897.48	
01/01/87	-1.00	5897.48	
05/07/87	-1.00	5897.48	
06/02/87	-1.00	5897.48	
06/24/87	-1.00	5897.48	
07/06/87	-1.00	5897.48	
08/06/87	-1.00	5897.48	
09/02/87	-1.00	5897.48	
10/05/87	-1.00	5897.48	
11/09/87	-1.00	5897.48	
12/01/87	-1.00	5897.48	

INDEX OF DATA

Boring No.: 64-86

Completed as well? Yes

Data in File

 X Log of Borehole
 X Well Construction Summaries
 X Well Development Summaries
 Hydraulic Conductivity Test Data
 and Results
 Packer Test Data and Results
 X Water Level Data

Project: Rocky Flats Plant

LOG OF BORING NO.

64-86

Date Drilled 9/10/86

Coordinates N 34683.8 E 22497.3

Boring Method Hollow Stem Auger

Ground Surface Elevation 5834.48

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch)		Water Content (%)		Other Tests
					20	40	20	40	
	0			<p>VALLEY FILL ALLUVIUM</p> <p>0-2.0'-Sample. Recovered 2.0/2.0'=100%. GRAVEL: grayish brown (5YR 3/2); granite and quartzite pebbles and cobbles; some silty and sand; poorly sorted; angular to subrounded; unconsolidated; dry.</p> <p>3.0'-Cuttings. GRAVEL: Same as above; dry.</p> <p>3.3-4.0'-Sample. Recovered 0.7/1.7'=41%. GRAVEL: Same as above; dry.</p> <p>4.0-6.0'-Sample. Recovered 2.0/2.0'=100%. GRAVEL: pale brown (5YR 5/2); granite and quartzite pebbles and cobbles; some silt and sand; grades downward into yellowish gray (5Y 7/2) silty sand; angular; unconsolidated; dry.</p> <p>6.0-8.0'-Sample. Recovered 0.6/2.0'=30%. GRAVEL: moderate yellowish brown (10YR 5/4); granite and quartzite pebbles and cobbles; sandy to clayey; poorly sorted; unconsolidated; angular; dry.</p>					

Remarks

Logged by: J. Bergman

Checked by:

Project No.

106P06222

Hydro-Search, Inc.

Page 1 of 2

Project: Rocky Flats Plant

LOG OF BORING NO. 64-86

Date Drilled 9/10/86

Coordinates N 34683.8 E 22497.3

Boring Method Hollow Stem Auger

Ground Surface Elevation 5834.48

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	8			8.0-10.0'-Sample. Recovered 2.0/2.0'=100%.					
				8.0-8.8'. CLAY: greenish gray (5GY 6/1) and moderate yellowish brown (10YR 5/4); trace granitic pebbles; poorly sorted; unconsolidated; dry.					
				ARAPAHOE FORMATION					
	10			8.8-10.0'. CLAYSTONE: greenish gray (5GY 6/1) and moderate yellowish brown (10YR 5/4); homogenous; some black organic fragments; consolidated; dry.					
	12			10.0-12.0'-Sample. Recovered 2.0/2.0'=100%. CLAYSTONE: moderate yellowish brown (10YR 5/4) with some greenish gray (5GY 6/1) clay; homogenous; consolidated; dry.					
	14			12.0-14.0'-Sample. Recovered 2.0/2.0'=100%. CLAYSTONE: moderate yellowish brown (10YR 5/4) with some greenish gray (5GY 6/1) clay; homogenous; consolidated; dry.					
				TOTAL DEPTH: 14.0'					
	16								

Remarks

Logged by: J. Bergman

Checked by: *HP*

Project No.

106P06222

Hydro-Search, Inc.

Page 2 of 2

WELL CONSTRUCTION SUMMARY

LOCATION or COORDS: _____
 N 34683.8 E 22497.3

ELEVATION: GROUND LEVEL 5834.48'
 TOP OF CASING 5836.46'

DRILLING SUMMARY:

TOTAL DEPTH Well: 9.00' Hole: 14.00'
 BOREHOLE DIAMETER 7 1/4"
 DRILLER Boyles Brothers Drilling Co.
 15865 W. 5th Avenue
 Golden, CO (Tony Robinson)
 RIG Acker
 BIT(S) T5
 DRILLING FLUID None
 SURFACE CASING 5" x 4' steel w/ locking cap

WELL DESIGN:

BASIS: GEOLOGIC LOG X GEOPHYSICAL LOG _____
 CASING STRING(S): C=CASING S=SCREEN

0.00'	3.41'	C1	-	-	-
3.41'	9.00'	S1	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

CASING: C1 2" I.D. Sch. 5 type 316 stainless steel, threaded and flush jointed.
 SCREEN: S1 2" I.D. Sch. 5 type 316 stainless steel, threaded and flush jointed, 0.010" wire wrap screen 0.25' welded bottom cap.
 CENTRALIZERS Type 304 stainless steel 4.81' - 6.31'
 FILTER MATERIAL 32-42 silica sand 2.50' - 9.25'
 CEMENT Portland Type I 0.00' - 2.00'
 OTHER 3/8" bentonite pellets 2.00' - 2.50'
 9.25' - 14.00'

CONSTRUCTION TIME LOG:

TASK	START		FINISH	
	DATE 1986	TIME	DATE 1986	TIME
DRILLING: 7 1/4" auger	9/10	1130	9/10	1330
GEOPHYS. LOGGING:	-	-	-	-
CASING: 2" stainless	9/10	1515	9/10	1520
FILTER PLACEMENT:	9/10	1520	9/10	1525
CEMENTING:	9/10	1535	9/10	1545
DEVELOPMENT:	9/13	1215	9/13	1215
OTHER: Bentonite	9/10	1525	9/10	1530
	9/10	1510	9/10	1515

WELL DEVELOPMENT

See Well Development Summary Sheet.

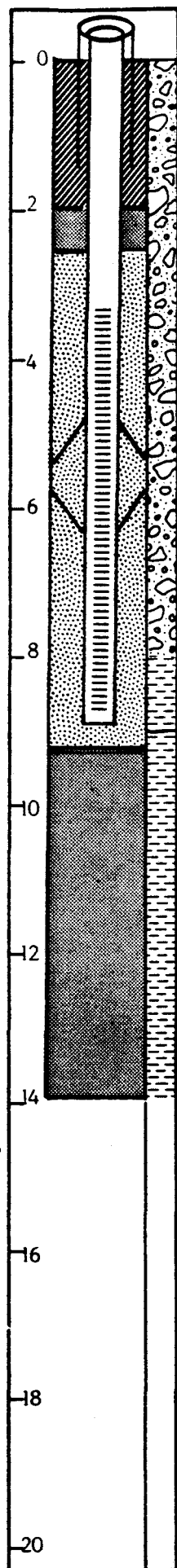
COMMENTS:

No water encountered during drilling.

Top of stainless steel casing: 1.98'

LOCATION Golden, CO
 PERSONNEL J. Bergman

PROJECT 106P06222
 Rocky Flats Plant



WELL 64-86

Hydro-Search, Inc. Reno • Denver

CONSULTING HYDROLOGISTS-GEOLOGISTS

12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
** Well Number: 6486			
09/13/86	-1.00	5836.46	
10/13/86	11.27	5836.46	5825.19
11/26/86	6.98	5836.46	5829.48
01/01/87	7.27	5836.46	5829.19
05/08/87	7.02	5836.46	5829.44
06/02/87	9.60	5836.46	5826.86
06/24/87	9.50	5836.46	5826.96
07/07/87	-1.00	5836.46	
07/16/87	7.70	5836.46	5828.76
08/06/87	10.70	5836.46	5825.76
09/02/87	10.60	5836.46	5825.86
10/06/87	10.60	5836.46	5825.86
11/09/87	10.50	5836.46	5825.96
12/01/87	9.30	5836.46	5827.16

INDEX OF DATA

Boring No.: 65-86

Completed as well? Yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☒ Well Development Summaries
- ☒ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

Project: Rocky Flats Plant

LOG OF BORING NO. 65-86

Date Drilled 9/13/86

Coordinates N 34886.7 E 24389.5

Boring Method Hollow Stem Auger

Ground Surface Elevation 5782.75

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	0			VALLEY FILL ALLUVIUM					
				0-0.4'-Sample. Recovered 0.4/0.4'=100%. CLAY: dusky yellowish brown (10YR 2/2); silty; trace of granitic pebbles; poorly sorted; unconsolidated; damp.					
				0.4-0.6'-Sample. Recovered 0.2/0.2'=100%. SAND: moderate yellowish brown (10YR 5/4); medium grained sand; clayey; moderately sorted; unconsolidated; angular; damp.					
				0.6-7.0'-Sample. Recovered 0.0/6.4'=0%. Cuttings. BOULDERS: granite and quartzite cobbles and boulders; wet.					
				ARAPAHOE FORMATION					
				7.0-9.5'-Sample. Recovered 2.5/2.5'=100%. CLAYSTONE: light olive gray (5Y 6/1); mottled iron staining; trace plant fossils; wet.					
				9.5-12.5'-Sample. Recovered 3.0/3.0'=100%. CLAYSTONE: Same as above; wet.					
				TOTAL DEPTH: 12.5'					
	15								
	20								

Remarks

Logged by: L. Pivonka

Checked by: 

Project No.

106P06222

Hydro-Search, Inc.

Page 1 of 1

WELL CONSTRUCTION SUMMARY

LOCATION or COORDS: _____
 N 34886.7 E 24389.5

ELEVATION: GROUND LEVEL 5782.75'
 TOP OF CASING 5784.40'

DRILLING SUMMARY:

TOTAL DEPTH Well: 8.00' Hole: 12.50'
 BOREHOLE DIAMETER 7 1/4"
 DRILLER Boyles Brothers Drilling Co.
15865 W. 5th Avenue
Golden, CO (Jim Horn)
 RIG Mobile B-57
 BIT(S) Blade bit
 DRILLING FLUID None
 SURFACE CASING 5" x 4' steel w/ locking cap

WELL DESIGN:

BASIS: GEOLOGIC LOG X GEOPHYSICAL LOG _____
 CASING STRING(S): C=CASING S=SCREEN

0.00' - 2.50'	C1	
2.50' - 8.00'	S1	
8.00' - 10.00'		
10.00' - 12.00'		
12.00' - 14.00'		
14.00' - 16.00'		
16.00' - 18.00'		
18.00' - 20.00'		

 CASING: C1 2" I.D. Sch. 5 type 316 stainless steel, threaded and flush jointed.
 SCREEN: S1 2" I.D. Sch. 5 type 316 stainless steel, threaded and flush jointed, 0.010" wire wrap screen
0.25' welded bottom cap.
 CENTRALIZERS Type 304 stainless steel
4.79' - 5.93'
 FILTER MATERIAL 32-42 silica sand
2.00' - 8.20'
 CEMENT Portland Type I
0.00' - 1.50'
 OTHER 3/8" bentonite pellets
1.50' - 2.00'
8.20' - 12.50'

CONSTRUCTION TIME LOG:

TASK	START		FINISH	
	DATE 1986	TIME	DATE 1986	TIME
DRILLING: <u>7 1/4" auger</u>	<u>9/13</u>	<u>1112</u>	<u>9/13</u>	<u>1310</u>
GEOPHYS. LOGGING:	—	—	—	—
CASING: <u>2" stainless</u>	<u>9/13</u>	<u>1445</u>	<u>9/13</u>	<u>1450</u>
FILTER PLACEMENT:	<u>9/13</u>	<u>1450</u>	<u>9/13</u>	<u>1506</u>
CEMENTING:	<u>9/13</u>	<u>1510</u>	<u>9/13</u>	<u>1523</u>
DEVELOPMENT:	<u>9/16</u>	<u>1222</u>	<u>9/19</u>	<u>1451</u>
OTHER: <u>Bentonite</u>	<u>9/13</u>	<u>1506</u>	<u>9/13</u>	<u>1510</u>
	<u>9/13</u>	<u>1435</u>	<u>9/13</u>	<u>1445</u>

WELL DEVELOPMENT

See Well Development Summary Sheet.

COMMENTS:

Water encountered at 4.50' during drilling.

Top of stainless steel casing: 1.65'

WELL 65-86

Hydro-Search, Inc. Reno • Denver

CONSULTING HYDROLOGISTS-GEOLOGISTS

AQUIFER TEST DATA

WELL 65-86

Type of Aquifer Test: Bail down - Recovery

Project No.: 106P06222

How Q Measured: 4.5 gallon bucket

Location: Rocky Flats Plant

How W.L.'s Measured: Olympic Well Sounder

Personnel: W. Herst, D. Pavlick

Measuring Point for W.L.'s: Top of Casing

Elevation of Measuring Point: 5790.2

Depth of pump/airline: N/A

Start bailing: 9/30/86 Time: 1007:00

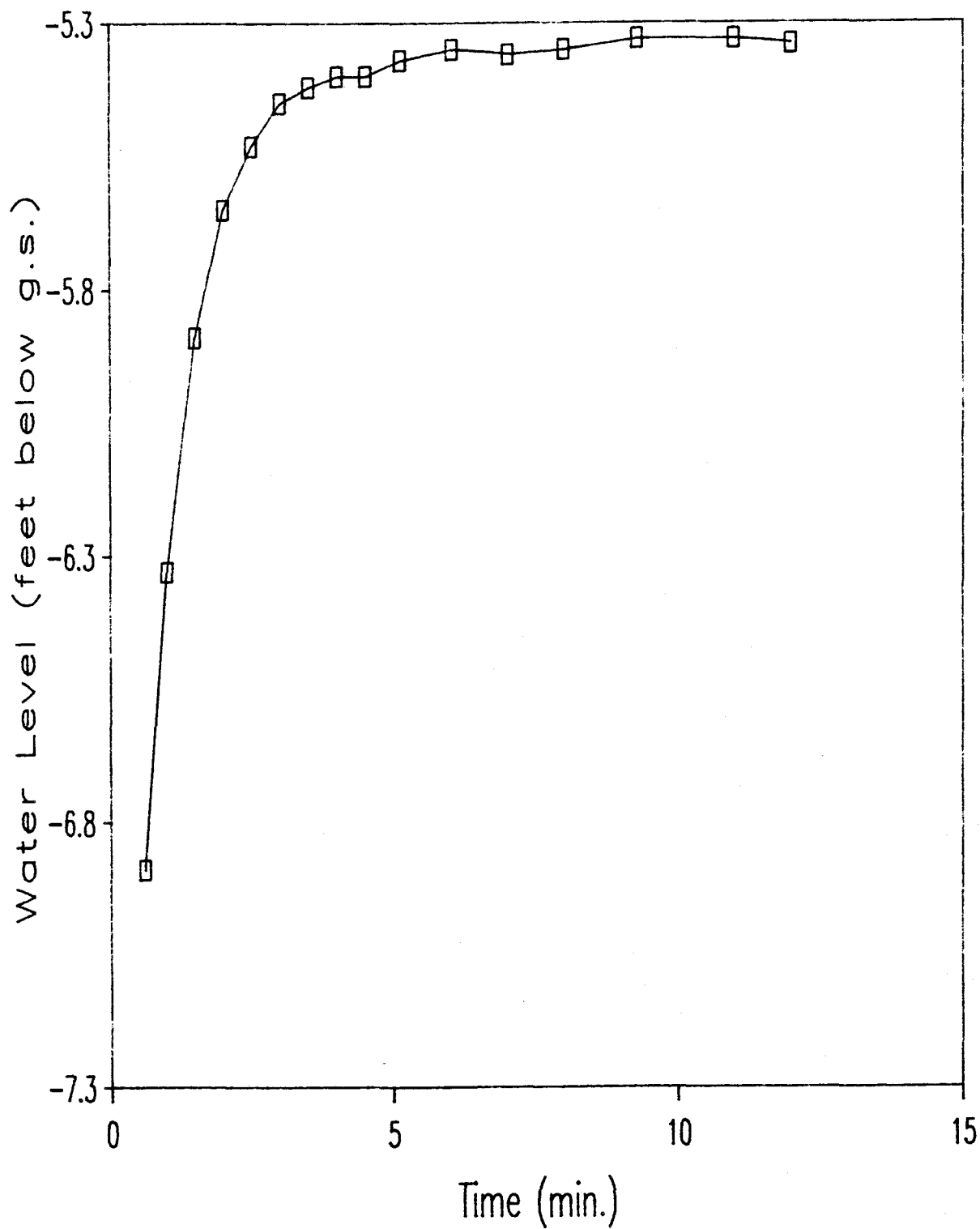
Stop bailing: 9/30/86 Time: 1010:00

Duration of Aquifer Test: 14.25 minutes

TIME		WATER LEVEL DATA		COMMENTS
t = 3	at t' = 0	Static Water Level: 5.3		
t	t'	Water Level	Draw-down	
0		5.30		Begin bailing
2.3				1 gallon bailed
3.0	0			Stop bailing
3.6	.6	6.89	1.59	
4.0	1.0	6.33	1.03	Total depth = 7.25
4.5	1.5	5.89	.59	
5.0	2.0	5.65	.35	
5.5	2.5	5.53	.23	
6.0	3.0	5.45	.15	90% recovered at 5.50'
6.5	3.5	5.42	.12	
7.0	4.0	5.40	.10	
7.5	4.5	5.40	.10	
8.1	5.1	5.37	.07	
9.0	6.0	5.35	.05	
10.0	7.0	5.36	.06	
11.0	8.0	5.35	.05	
12.3	9.3	5.33	.03	
14.0	11.0	5.33	.03	
15.0	12.0	5.34	.04	Stop test

AQUIFER TEST DATA

WELL 65-86



12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
** Well Number: 6586			
09/16/86	7.15	5784.40	5777.25
09/17/86	7.19	5784.40	5777.21
09/19/86	7.32	5784.40	5777.08
09/24/86	7.32	5784.40	5777.08
10/13/86	6.45	5784.40	5777.95
11/26/86	6.06	5784.40	5778.34
01/01/87	6.04	5784.40	5778.36
05/08/87	5.88	5784.40	5778.52
06/02/87	6.58	5784.40	5777.82
07/07/87	7.10	5784.40	5777.30
07/16/87	7.10	5784.40	5777.30
08/06/87	7.30	5784.40	5777.10
09/02/87	7.00	5784.40	5777.40
09/08/87	7.90	5784.40	5776.50
10/05/87	7.30	5784.40	5777.10
11/03/87	6.90	5784.40	5777.50
12/01/87	6.38	5784.40	5778.02

INDEX OF DATA

Boring No.: 66-86

Completed as well? Yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☒ Well Development Summaries
- ☐ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

Project: Rocky Flats Plant


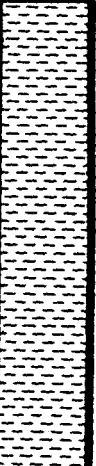
LOG OF BORING NO. 66-86

Date Drilled 9/13/86

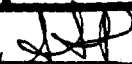
Coordinates N 33638.7 E 28151.6

Boring Method Hollow Stem Auger

Ground Surface Elevation 5685.12

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	0			<p>VALLEY FILL ALLUVIUM</p> <p>0-1.6'-Sample. Recovered 1.6/1.6'=100%. GRAVEL: dark yellowish brown (10YR 4/2); granitic pebbles and cobbles with coarse to fine-grained sand; clayey; poorly sorted; subangular; unconsolidated; dry.</p> <p>1.6-5.8'-Sample. Recovered 0.0/4.2'=0%. Cuttings. BOULDERS: granite and quartzite cobbles and boulders; moist.</p> <p>Wet at 4.5'</p>					
	5			<p>ARAPAHOE FORMATION</p> <p>5.8-9.0'-Sample. Recovered 3.2/3.2'=100%. CLAYSTONE: light olive gray (5Y 6/1); mottled iron staining; weathered; consolidated; damp.</p> <p>9.0-12.0'-Sample. Recovered 3.0/3.0'=100%. CLAYSTONE: Same as above; damp.</p> <p>TOTAL DEPTH: 12.0'</p>					
	10								
	15								
	20								

Remarks Logged by: L. Pivonka

Checked by: Project No.
106P06222

Hydro-Search, Inc.

Page 1 of 1

12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
** Well Number: 6686			
09/22/86	7.25	5686.73	5679.48
09/23/86	7.35	5686.73	5679.38
09/23/86	7.24	5686.73	5679.49
09/24/86	7.27	5686.73	5679.46
09/25/86	7.83	5686.73	5678.90
10/13/86	5.36	5686.73	5681.37
11/03/86	5.00	5686.73	5681.73
11/26/86	4.74	5686.73	5681.99
01/01/87	4.46	5686.73	5682.27
05/08/87	4.83	5686.73	5681.90
06/02/87	4.45	5686.73	5682.28
07/07/87	5.40	5686.73	5681.33
07/17/87	-1.00	5686.73	
08/06/87	7.30	5686.73	5679.43
09/02/87	7.20	5686.73	5679.53
09/08/87	7.90	5686.73	5678.83
10/01/87	6.20	5686.73	5680.53
11/03/87	5.00	5686.73	5681.73
12/01/87	4.77	5686.73	5681.96

INDEX OF DATA

Boring No.: 67-86

Completed as well? Yes

Data in File

- ☒ Log of Borehole
- ☒ Well Construction Summaries
- ☒ Well Development Summaries
- ☐ Hydraulic Conductivity Test Data
and Results
- ☐ Packer Test Data and Results
- ☒ Water Level Data

Project: Rocky Flats Plant




LOG OF BORING NO. 67-86

Date Drilled 9/16/86

Coordinates N 37702.2 E 28085.9

Boring Method Hollow Stem Auger

Ground Surface Elevation 5796.26

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	0			<p style="text-align: center;">SLOCUM ALLUVIUM</p> <p>0-0.6'-Sample. Recovered 0.6/0.6'=100%. GRAVEL: dusky yellowish brown (10YR 2/2); granitic pebbles and cobbles; some silty sand; poorly sorted; unconsolidated; moist.</p> <p>0.6-1.5'-Sample. Recovered 0.9/0.9'=100%. GRAVEL: dark yellowish brown (10YR 4/2); granitic pebbles and small cobbles; clayey; poorly sorted; unconsolidated; moist.</p> <p>1.5-5.0'-Sample. Recovered 1.6/3/5'=46%. GRAVEL: grayish orange (10YR 7/4); granitic pebbles and small cobbles; some silt and sand; poorly sorted; unconsolidated; wet.</p> <p>5.0-6.5'-Sample. Recovered 1.5/1.5'=100%. GRAVEL: dark yellowish brown (10YR 4/2); granitic pebbles; silty; trace of fine-grained sand; poorly sorted; unconsolidated; wet.</p> <p>6.5-7.1'-Sample. Recovered 0.2/0.6'=33%. GRAVEL: grayish orange (10YR 7/4); silt, sand gravel and small cobbles abundant; unsorted; unconsolidated; wet.</p> <p>7.1-9.6'-Sample. Recovered 1.7/2.5'=68%. GRAVEL: moderate yellowish brown (10YR 5/4); fining upward sequence including fine-grained sand, coarse gravel and cobbles; abundant quartzite and granite; unsorted; unconsolidated; wet.</p>					
	2								
									
	4								
	6								
	8								

Remarks

Logged by: L. Pivonka

Checked by: Project No.
106P06222

Hydro-Search, Inc.

Page 1 of 2

Project: Rocky Flats Plant

LOG OF BORING NO. 67-86

Date Drilled 9/16/86

Coordinates N 37702.2 E 28085.9

Boring Method Hollow Stem Auger

Ground Surface Elevation 5796.26

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch)		Water Content (%)		Other Tests
					20	40	20	40	
	8								
	10			9.6-12.1'-Sample. Recovered 1.4/2.5'=56%. GRAVEL: Same as above; sandy; wet. 12.1-14.0'-Sample. Recovered 0.0-1.9'=0%. Cuttings. GRAVEL: granite and quartzite cobbles; wet.					
	12								
	14			ARAPAHOE FORMATION 14.0-15.0'-Sample. Recovered 0.0/1.0'=0%. Cuttings. CLAYSTONE. 15.0-16.5'-Split Spoon. Recovered 1.5/1.5'=100%. CLAYSTONE: light olive gray (5Y 6/1); mottled iron staining; weathered; moist.					
	16			TOTAL DEPTH: 15.0'					

Remarks

Logged by: L. Pivonka

Checked by: *LLP*

Project No.

106P06222

Hydro-Search, Inc.

Page 2 of 2

WELL 67-86

Hydro-Search, Inc. Reno • Denver

CONSULTING HYDROLOGISTS-GEOLOGISTS

12/11/87

Water Level Data
for
Rockwell (Rocky Flats)

<u>Date Measured</u>	<u>Depth to Water from TOC</u>	<u>Elevation TOC (ft)</u>	<u>Water Level Elev. (ft)</u>
** Well Number: 6786			
09/25/68	4.13	5797.73	5793.60
09/22/86	4.43	5797.73	5793.30
09/23/86	3.86	5797.73	5793.87
09/24/86	4.19	5797.73	5793.54
10/03/86	3.77	5797.73	5793.96
10/13/86	4.59	5797.73	5793.14
01/01/87	11.83	5797.73	5785.90
05/07/87	9.42	5797.73	5788.31
06/01/87	10.20	5797.73	5787.53
06/01/87	7.20	5797.73	5790.53
07/07/87	12.10	5797.73	5785.63
07/20/87	12.90	5797.73	5784.83
08/06/87	13.50	5797.73	5784.23
09/01/87	14.40	5797.73	5783.33
10/22/87	14.80	5797.73	5782.93
11/09/87	14.80	5797.73	5782.93
12/01/87	14.75	5797.73	5782.98